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Memoirs of the Department of Agriculture in India

A Contribution to our Knowledge of the Thysanoptera of India

BY

T. V. RAMAKRISHNA AYYAR, B.A., Ph.D., F.Z.S.
Lecturer in Entomology, Agricultural College, Coimbatore.

AGRICULTURAL RESEARCH INSTITUTE, PUSA

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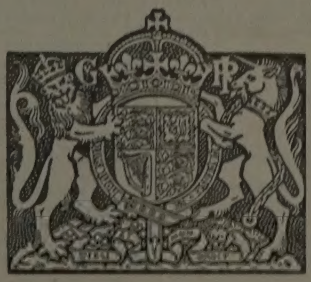

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A CONTRIBUTION TO OUR KNOWLEDGE OF THE THYSANOPTERA OF INDIA.*

BY

T. V. RAMAKRISHNA AYYAR, B.A., Ph.D., F.Z.S.,

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(Received for publication on 9th January 1928.)

INTRODUCTION

In India, the Insect Order which forms the subject of this paper has hitherto received very scant attention from entomologists in comparison with that bestowed on other major divisions of the large group " Insecta ". That these creatures are not in any way scarce in the country has been found by recent experience. This apparent neglect, therefore, may perhaps be attributed mainly to the small size, the unattractive colors, and the unobtrusive habits of these insects, unlike the many larger and more conspicuously colored butterflies, beetles, grasshoppers or wasps. Another factor that might have contributed in this direction may be the fact that, as yet, few members of this group have seriously interfered with the farmer's welfare, as in some other countries. Our knowledge of the Indian *Thysanoptera* is therefore extremely meagre.

The writer's serious attention was drawn to this group of insects for the first time in May 1915, when he noted a species of " thrips ", since described as a new species *Thrips oryzae* W.[1], causing some appreciable injury to the rice crop in the Chingelput district in South India. This incident, coupled with the knowledge that practically very little attention has been paid to this group in India, naturally created some interest and stimulated the idea of doing some work in this almost unexplored field. Since then, as more important duties permitted, occasional collections and field observations of *Thysanoptera* were made from different parts of the country. As the collections began to accumulate small consignments of the material were submitted to some of the well known specialists on the group for identification in order to get some preliminary working knowledge of the group and a nucleus of correctly identified forms to start with. As a result a few papers containing descriptions of new forms from the material submitted were published by these authorities ; and later the writer himself issued a few preliminary papers on the subject. These publications are referred to in the next paragraph. In

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* This paper was prepared and submitted by the author as a thesis in partial fulfilment of the requirements for the Degree of Doctor of Philosophy at the Stanford University, California, during the summer quarter of 1927.

[1] WILLIAMS, C. B. *Thrips oryzæ* sp. new ; injurious to rice in India. *Bulletin of Entomological Research*, London, Vol. VI, pp. 353-355 (with fig. 1), 1915-1916.

this present paper it is the idea of the writer to bring together, as a connecte. record, our knowledge of all the *Thysanoptera* so far known from India, not only by presenting the results of the study made on the writer's collections, both by others and himself, but also by the incorporation of all other records published on Indian forms. This paper does not, by any means, presume to be a complete account of all Indian *Thysanoptera ;* for, no one realizes more than the author how very wide the field is for further study and investigation. But he hopes that this contribution may be useful to others who may attempt to advance our fund of knowledge regarding this very interesting but little known group of Indian insects.

In carrying on this study the author has received liberal help from various quarters and he takes this opportunity of expressing his gratitude for the same. First and foremost, he is under a very deep debt of obligation to Dr. H. Karny of the Zoological Museum, Buitenzorg, Java, one of the foremost authorities on the group *Thysanoptera ;* in fact, the writer's interest in the subject was considerably enhanced by the prompt help, warm encouragement, and the extremely valuable suggestions and criticisms he has been continually receiving from Dr. Karny. The author is also indebted to Dr. Karny for the use in this paper of some of the figures from his memoir on Indian Thysanoptera. For studying the materials submitted by him during the early years he feels thankful to Messrs. J. D. Hood and R. S. Bagnall. The writer also expresses his sincere thanks to Dr. H. Priesner of Austria, another well known thysanopterist, for help and suggestions in connection with the study of some of the new forms described in this paper. During the latter part of this study, the author received help of a very substantial nature from Mr. Dudley Moulton of San Francisco, one of the pioneer thysanopterists of America, and for this he cannot feel adequately grateful ; not only did Mr. Moulton place his very large and valuable collection of *Thysanoptera* at the writer's disposal for study and comparison, but he also gave very valuable and helpful suggestions. For helping him with small collections of material the author is thankful to his fellow workers at Coimbatore, *viz.*, Messrs. Y. R. Rao, M. C. Cherian, T. V. Subramanium, J. A. Mulyil, V. Tirumal Rao, V. Margabandu, G. Nair, A. G. Ramaswamiah, and N. Krishna Menon. The latter part of this study and the preparation of this paper were made at the Zoological Laboratories of the Stanford University, California, under the guidance of Professor R. W. Doane, and to him the author is very grateful for numerous courtesies and valuable suggestions during the course of his work at Stanford. To Professor J. O. Snyder, the head of the Zoological Department of the University, and to Professors Mary I, McCracken, and G. F. Ferris the author hereby expresses his thanks for the excellent facilities afforded for work and for many helpful suggestions. The author is also indebted to Dr. Marshall of the Imperial Bureau of Entomology, and to Mr. F. Laing of the British Museum for their courtesy in allowing him to examine the Thysanoptera collection in the British Museum, during his stay in London, and for the loan of some specimens for comparison.

PREVIOUS WORK ON INDIAN THYSANOPTERA.

The earliest known record of *Thysanoptera* from India is to be found in a paper by Newman [1] in 1856 where two species are described from the state of Mysore in South India, *viz.*, *Idolothrips halidayi*, N., and *Phlœothrips anacardii*, N. For over half a century since then nothing further was added until 1908, when Buffa [2] recorded a species *Dinothrips sumatrensis* [2], B. as having been collected from Bhamo in Burma in 1885-1887. In 1909, Kieffer [3] described the species *Cecidothrips bursarum* from Trichinopoly in South India. In 1912 the well known thysanopterist Bagnall [4a] published a description of the insect *Panchætothrips indicus* from material collected in Madras, and sent through the Indian Museum, Calcutta. These are the earliest records of Thysanoptera from India known to the author. From the year 1912 records of Indian forms gradually began to increase. During the next three years Bagnall [4b-f] described eight new Indian forms. In 1914 we find the record of another new species, *Dicaiothrips bouvieri*, described by Viuellet [5] from the Nilgiri hills in South India.

Thus, at the time the writer started work in 1915, only fourteen species of Indian Thysanoptera were known. These are :—

1. *Idolothrips halidayi*, N.
2. *Phlœothrips anacardii*, N.
3. *Dinothrips sumatrensis*, B.
4. *Cecidothrips bursarum*, K.
5. *Panchætothrips indicus*, B.
6. *Paneurothrips coriaceus*, B.
7. *Heliothrips indicus*, B.
8. *Physothrips lefroyi*, B.
9. *Physothrips usitatus*, B.
10. *Phoxothrips breviceps*, B.
11. *Leeuwenia indica*, B.
12. *Ecacanthothrips sanguineus*, B.
13. *Dicaiothrips bouvieri*, V.
14. *Hindsiana apicalis*, B.

---

[1] Newman, E. Two undescribed species of Thrips. *Transactions of the Entomological Society London*, III, pp. 264-267, 1856.

[2] Buffa, P. Tisanotteri esotici esistenti nel Museo livicodi storia Naturale di Genova. *Redia* V., p. 165, 1908. Also VIII, 1909.

[3] Kieffer, J. J. *Marcellia*, Vol. VII, p. 165, 1909.

[4] Bagnall, R. S. On a new species of Indian 'Thrips' injurious to turmeric—

(*a*) *Records of the Indian Museum, Calcutta*, VII, p. 257, 1912.
(*b*) „ „ „ VIII, p. 201, 1913.
(*c*) *Annals and Magazine of Nat. History*, London, (8) vol. IX, 1912.
(*d*) „ „ „ „ (8) „ XII, 1913.
(*e*) „ „ „ „ (8) „ XIV, 1914.
(*f*) „ „ „ „ (8) „ XV, 1915.
(*g*) „ „ „ „ (8, 9) all Vols. from 1916 to 1927. Papers on Thysanoptera.

(*h*) *Bulletin of Entomological Research*, London, XIV, p. 455, 1924.
(*i*) *Annales Soc. Ent. Belgique*, LII, pp. 348-352, 1908.

[5] Vuillet, A. Description du'n *Dicaiothrips* nouveau de L'Inde., *Bull. de la Société entomologique de France*, pp. 276-277 (fig. 1), 1914.

The next record is the description by Williams [1] of the new form *Thrips oryzæ*, collected by the writer on the rice plant in 1915. In 1919 Hood [2] published a paper containing descriptions of half a dozen new forms from the material forwarded to him by the writer in 1916. From another consignment sent by the author to Bagnall, this authority described a few new forms in his serial papers and, in addition, he also described a few others received by him from other Indian sources. In 1924 the writer submitted a fairly large consignment to the well known authority, Dr. Karny of Java, and a paper [3] was published last year describing about twenty new forms from this material. Meanwhile the writer also issued four[4] short papers as a result of his preliminary work. Reviewing the work so far done, it is found that 89 species have thus far been recorded from India. Of these, 58 species, including some new genera and many new species, have been noted from the material brought together by the writer since 1915. In the present study 37 new records are added; thus the total number of known species have been brought up to 126 as against 14 forms that were known in 1915.

MATERIAL AND METHODS USED IN THIS STUDY.

The results of the studies here recorded are based mainly on the material brought together by the author at different times since the year 1915, supplemented by a few additional specimens collected by the author's fellow workers in the Agricultural

---

[1] Williams, C. B. *Thrips oryzæ* sp. new; injurious to rice in India. Bulletin of Entomological Research, London, London, Vol. V[1], pp. 353—355 (with fig. 1), 1915—1916.

[2] Hood, J. D. On some new Thysanoptera from South India. *Insecutor Inscitiæ Menstruus*, vol. VII, pp. 90-103 (Pl. 2), 1919.

(*a*) New Genera and Species of Illinois Thysanoptera, *Bulletin of Ill. St. Laboratory*, VIII, 1908.
(*b*) New Genera and Species of Australian Thysanoptera *Memoirs of the Queensland Museum*, VI, pp. 121-150, 1918.
(*c*) An outline of the insect order Thysanoptera. *Proceedings of the Biological Society of Washington*, XXVIII, pp. 53-60, 1915.
(*d*) And Williams, C. B. New Thysanoptera from Florida, *Journal of the New York Entom. Socy.*, XXXIII, p. 133, 1915.
(*e*) *Proc. Biol. Socy., Washington*, XXV, p. 66, 1912.
(*f*) On the synonymy of some Thysanoptera. *Pan Pacific Entomologist*, Vol. III, pp. 175-176, 1927.

[3] Karny, H. H. Notes on Indian Thysanoptera, *Ent. Mem. Dept. Agri. India*, IX (6), pp. 187-239, (pl. and figs.) 1926—

(*a*) Thysanoptera from Siam and Indo China. *Journal of Siam Society*, XVI, pp. 91-153, 1923.
(*b*) Thysanoptera of Mjöberg Expedition to Australia. *Arkiv for Zoologi* Band 17A, No. 2, pp. 1-56, 1924.
(*c*) Thysanoptera on tobacco in Java and Sumatra, *Bull. No. 23, Deli Profestation Te Medan-Sumatra*, 1925.
(*d*) Papers on Thysanoptera in *Treubia*, Vols. I-IV, from 1921.
(*e*) Papers on Thysanoptera in *Marcellia*, XI, 1912.

[4] Ayyar, T. V. R. (*a*) On our present Knowledge of Indian Thysanoptera and their Economic. Importance, *Rept. 3rd Entomol. Meeting, Pusa, India*, pp. 612-618, 1919.

(*b*) 'Thrips.' Insects little known in India, *Jour. Agr. St. Union, Madras*, XIII, pp. 1-7, 1925.
(*c*) Annotated list of the Thysanoptera Known from India and Ceylon, *Jour. of the Bombay N. H. Society*, XXX, pp. 861-871, 1925.
(*d*) Two New Thysanoptera from South India, *Journ. of the Bombay N. H. Society*, XXX, p. 872, 1925.

College and Research Institute at Coimbatore. Most of the collecting was done in the peninsular area of India, *viz.*, the South, and chiefly in the Plains. Very extensive tracts of country yet remain unexplored, offering a very wide field for further collection and investigation.

This paper treats very briefly the salient facts of the organisation and biology of the group *Thysanoptera* with special reference to Indian forms, and follows with a systematic treatment of all the forms known from India, including descriptions of new forms and available notes regarding individual species. The main purpose of this study has been to get a better knowledge of the different species found in the country in order that further biological observations may be made on each definitely identified species. In other words, the study has been chiefly systematic and no attempt has been made at any detailed study of the morphological or physiological aspects. It need hardly be added that the rapid expansion of economic work at the present day has made systematic studies a fundamental requisite. It is believed that this paper, by reason of this necessity, may have an economic value as well.

Technique. Due to the comparatively minute size of these insects, an accurate study of the structural features becomes possible only after they are specially treated and prepared for microscopic study. The author has found the following methods satisfactory. *Thysanoptera* when collected are dropped into 70 or 75 per cent. alcohol and in this condition they may be preserved for fairly long periods. To prepare them for the microscope, first keep the specimens in absolute alcohol for two or three hours for dehydration; after this transfer to clove oil and allow them to remain in the oil for twelve to twenty-four hours, and at the end of this period they can be mounted in balsam. In cases where the specimens are opaque and the study of the chætotaxy becomes difficult with the above process alone, they are boiled in potash solution, dehydrated, cleared and then mounted. In this latter case, the specimens will lose their original color, and winged forms will be deprived of the wings. To provide for this contingency in cases where there is only one specimen, the color is previously recorded and the wings are carefully removed and mounted separately before boiling in potash. Since the chætotaxy of the wings is important in classification, it is desirable that the wings be spread out properly when mounting. It is always essential that only one specimen be mounted on each slide to avoid mixing different species on the same slide.

THE GENERAL CHARACTERS OF THYSANOPTERA WITH SPECIAL REFERENCE TO INDIAN FORMS.

Form, Shape and Structural Features.

The members of the group *Thysanoptera* are popularly known in different countries as "Thrips", "Black fly", "Fringe-wings", etc. Most of these are very small in size, rarely exceeding 2 or 3 mm. in length; while many are very

small and even microscopic, the giants among them do not reach more than 8 to 12 mm. Of the Indian species, some of the Thripidæ such as *Anaphothrips oligochætus*, K., *Dendrothripoides ipomœa*, B., *Stylothrips brevipalpis*, K., are very small forms ranging from ·6 to ·8 mm. Of the larger species, which are usually met with among the Tubulifera, we have in India species of such genera as *Gynaikothrips*, *Arrhenothrips*, *Leeuwenia*, *Mesothrips*, *Dolichothrips*, and *Rhynchothrips* reaching to 3 or 4 mm. in length ; the longest forms so far known are the two species of *Gigantothrips* (6-7 mm.) and the species *Kleothrips subramanii*, R. reaching 9 mm. The Australian form *Idolothrips spectrum*, H., which is about half an inch in legnth, is known as the Giant Thrips of Australia. The general shape of the body in *Thysanoptera* is long and narrow with the three chief regions of the body distinctly marked out. (Fig. 1a).

Fig. 1 (*a*). *Heliothrips indicus*, B., ♀.

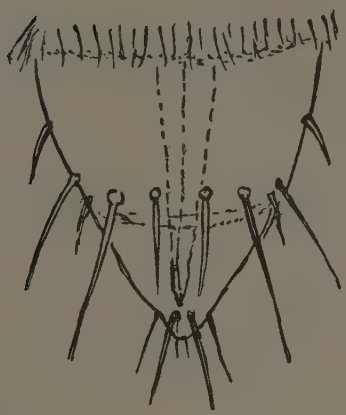


FIG. 1(*b*). *Hel. indicus*, B. Post end of abd. of ♀.

The *Head* is moderately long but narrower than the thorax ; it is broadly conical or triangular in shape with moderate powers of movement. In some of the Indian genera, such as *Perissothrips*, *Anaphothrips*, etc., the head is comparatively very small and more or less ovoid or spherical. In others, especially in the genus *Kleothrips*, the vertex is unusually produced anteriorly into a long narrow process often carrying the two antennæ far forward, as in some weevils. There is no distinct neck between the head and thorax though in a few species like *Rhipiphorothrips cruentatus*, H. the basal region of the head is constricted to form a neck region. The important organs of the head are the two compound eyes, the ocelli, the feelers, and the mouth parts. The compound eyes are usually large and oval, circular or reniform. Three ocelli are usually found disposed in a triangle between the eyes, one above and two below in a line. Often, the front ocellus is carried forward in species where the vertex is anteriorly produced, as in *Gigantothrips*, *Idolothrips*, etc. In some forms the ocelli are atrophied or even absent, this latter being the case in apterous species. The ocellar cups often contain brightly colored pigment granules as in some species of *Anaphothrips*, *Scirtothrips*, etc. The antennæ are always longer than the head, often two or three times as long ; they are generally filiform or moniliform and usually have from six to nine joints. Most of the Indian

species possess 7 or 8-jointed antennæ. Among the Thripoidea the number is usually seven or eight while in the Tubulifera it is invariably eight. The only

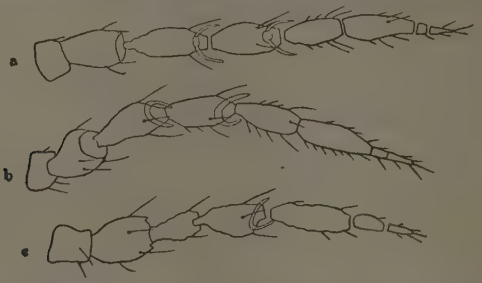


Fig. 2 (*a*). *Frankliniella sulphurea*, Schmutz, *a* normal antenna of a ♀ from *Lablab* ; *b* normal antenna of a ♀ from *Lantana* flowers ; *c* anomalous ("Ceratothripoid") antenna of a ♀ from *Crotalaria*. (From Karny.)

Fig. 2 (*b*). Antenna of *Gynaikothrips interlocatus*, Ky. (From Karny.)

forms so far known from India which have 9-jointed antennæ are the two Aeolothripid species *Orothrips raoi* M. and *Aeolothrips fulvicollis* B., and the new Heterothripid *Adiheterothrips jambudvipa*. Frequently an anamolous condition is met with in the number of antennal joints, often differing in the same insect ; see fig. 3.

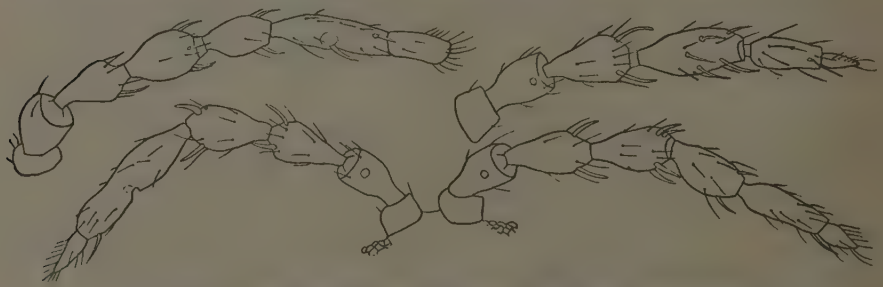


Fig. 3 (*a*). Anomalous antennae of *Neoheegeria indica*, Hood. (From Karny.)

Fig. 3 (*b*). *Rhipiphorothrips cruentatus*, H. ♀, anomalous antenna. (From Karny.)

The antennæ carry sense-organs of different types. In the *Aeolothripoidea*, including the first two forms noted above, these organs are in the shape of elongated

or oval membranous areas on the ventral side of the 3rd and 4th joints. In *Adiheterothrips* the sense cone on the 3rd and 4th joints is found in the form of a small two-jointed process at the apex of each joint pointing outwards. In the other groups spines are specialized in various ways to form sense cones which are found chiefly on the middle joints. The tubuliferous form *Ecacanthrothrips sanguineus* is unique in that the third segment of the antenna has a ring of crest-like large sense cones. In the Thripid forms such as *Ayyaria*, *Frankliniella*, *Tæniothrips*, *Anaphothrips*, *Mycterothrips*, and *Thrips*, the 3rd and 4th antennal joints also possess sense cones which are forked. The variations in size, shape and armature of the antennæ appear to be of great taxonomic value.

The lateral margins of the head which are called *genæ*, or cheeks, are entire, crenulate or even warty, and in some species, especially in *Dinothrips sumatrensis*, B., the two species of *Ramakrishnaiella*, *Kleothrips subramanii*, R., and *Leuweenia karnyi*, R., the cheeks bear sharp spines or bristles in varying numbers and sizes.

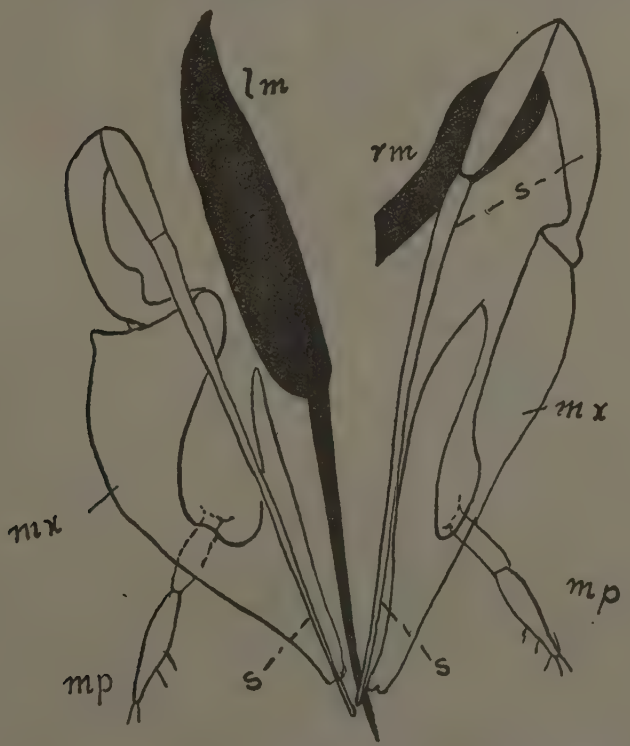


FIG. 4 (*a*). Mandibles and maxillae of Terebrantia (Heliothrips).

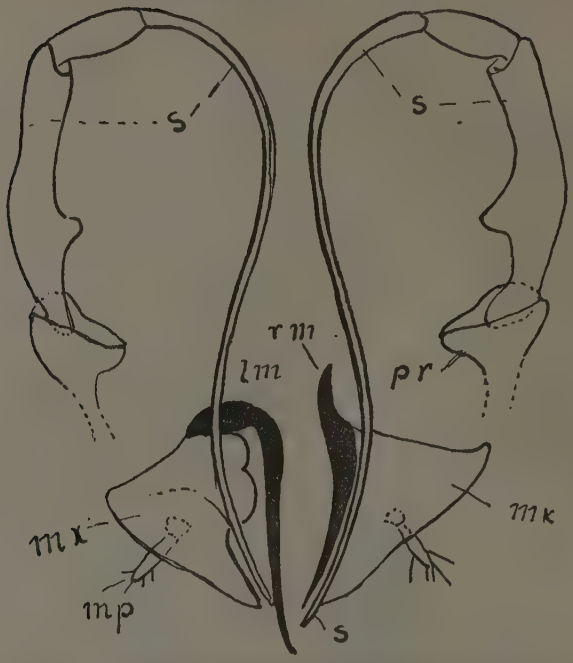


FIG. 4 (*b*). Mandibles and maxillae of Tubuliferan (Cephalothrips).

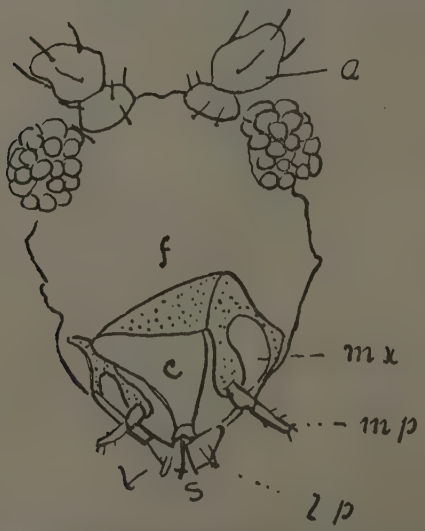


FIG. 4 (*c*). Dorsal aspect of head of Terebrantia (Heliothrips).

lm	= left mandible.	pr	= internal process of head.
rm	= right mandible	a	= base of antenna.
mx	= maxillary plate.	c	= clypeus.
mp	= maxillary palp.	f	= frons
s	= maxillary stylet.	l	= labrum.

[*4a, b, c* from Peterson.]

The mouth-parts,[1] which are adapted for piercing and sucking, are formed as a cone-shaped structure attached to the ventral side of the head. This mouth-cone is in some species very short, bluntly or roundly pointed, and does not extend far backwards ventrally towards the prosternum ; striking examples are the many species of *Haplothrips* and *Eothrips*. In the genera *Mycterothrips*, *Perisso*

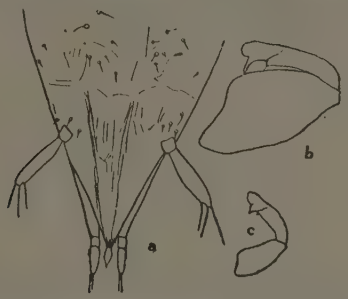


FIG. 5 (*a*). *Arrhenothrips ramakrishnae*, Hood, *a* mouth cone ; *b* fore leg of a megalomerous, *c* of a micromerous specimen ; *b* and *c* under the same magnification.

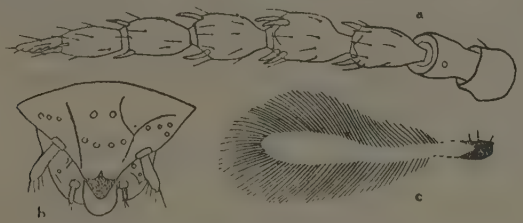


FIG. 5 (*b*). *Haplothrips ramakrishnai*, Karny, *a* antenna ; *b* mouth cone ; *c* fore wing. [Fig. 5 *a* and *b* from Karny.

thrips, *Liothrips*, *Neoheegeria*, *Rhynchothrips*, *Arrhenothrips*, and *Dolichothrips* the cone is long, sharply pointed, and extends sharply backward into the prosternum, and sometimes even into the mesosternum, as in the new *Brachythrips dirghavadana*. In the new *Neoheegeria hrisvamukha* though the cone is sharply pointed, it is very short and hardly reaches the middle of the prosternum. In the structure and homology of the mouth parts, the *Thysanoptera* are unique among insects since these parts show asymmetry. The right mandible is vestigial, while the left one is normally developed. Peterson[2] discusses this subject in his interesting paper published in 1915. Some of his important conclusions on this subject are :—

(i) The resemblance between the mouth parts of the Thysanoptera and Orthoptera is apparently closer than the resemblance between the mouth parts of Hemiptera and Orthoptera.

[1] The author has recently seen the review of a paper by A. Reyne on 'Investigation of the mouth parts of Thysanoptera' published at Utrecht in 1926, but not the original paper itself.

[2] PETERSON, A. Morphological studies on the head and mouth parts of the Thysanoptera *Annals of the Entomological Society of America*, VIII, pp. 20-60, pl. 1, VII, 1915.

(ii) The mouth parts of Thrips are fitted for sucking.

(iii) The parts of the mouth are in the form of a cone which encloses the piercing organs. The cone is composed of the clypeus, labrum, maxillary sclerites and labium.

(iv) The mouth parts of Thrips are asymmetrical.

The maxillary palpi have 2 to 8 joints and the labial palpi 1 to 4 joints. In some species, as in those of the genus *Trichothrips*, the labrum is sharply pointed and extends beyond the mouth cone.

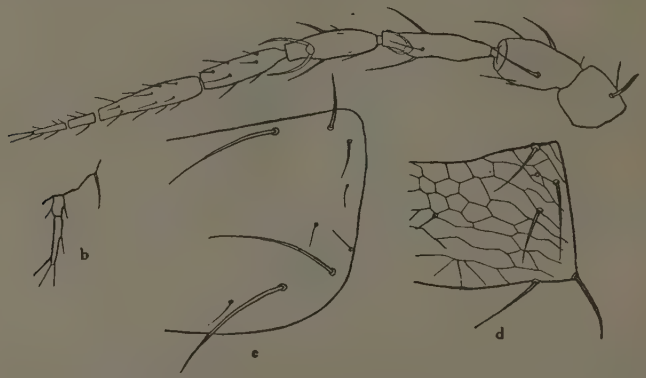


FIG. 6 (*a*). *Ayyaria chaetophora*, Karny. ♀; *a* antenna; *b* maxillary palpus; *c* chaetotaxy of prothorax; *d* chaetotaxy of third abdominal segment.

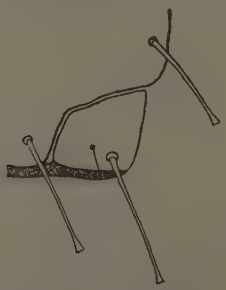


FIG. 6 (*b*). *Eurhynchothrips ordinarius*, Hood; hind part of prothorax, chaetotaxy. (From Karny.)

The *Thorax* is made up of two distinct parts, the anterior prothorax which is distinct and freely movable, and the posterior region made up of the meso- and metathoracic segments connected together into a compact structure called the *Pterothorax*. The prothorax is oval, rectangular or trapezoid, and is usually as wide or wider than the head; it is strongly chitinised and bears conspicuous bristles

in many species, the bristles being especially conspicuous at the postero-lateral angles. In forms like *Rhipiphorothrips cruentatus* H., and *Dendrothrips indicus* B., the prothorax is short and ovoid and bears no spines. In genera like *Thrips*, *Tæniothrips*, *Ayyaria*, *Frankliniella*, and in many tubulifera the prothorax has a few well developed spines along the margins which are either pointed or dilated

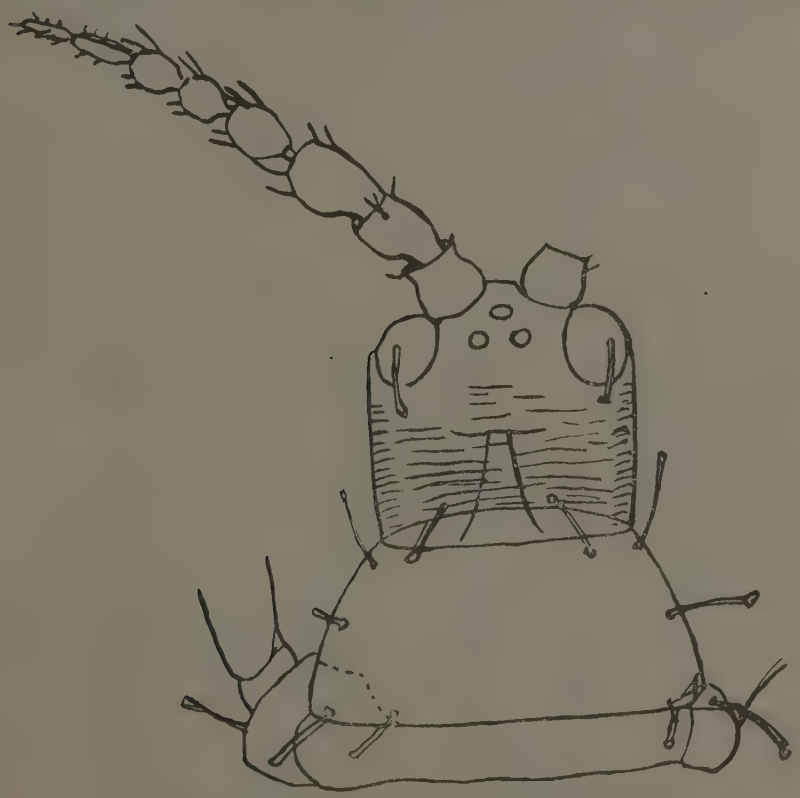


Fig. 7. Head and prothorax of Austrothrips. (From Karny.)

at the tips. The new species *Rhipiphorothrips karna* is unique in that the prothorax has on each side a leaflike lateral expansion at the postero lateral region. The pterothorax is broader than the prothorax, and is usually the broadest and strongest region of the body. *Legs.* Excepting the anterior pair all the legs are generally uniform in structure. In the former a considerable degree of variation occurs in size and shape, especially among the species of tubulifera. In forms like *Ecacanthothrips sanguineus* B., *Androthrips flavipes* K. and *Kleothrips subramanii* R., the front femur is swollen and bears tubercles, spines, or bristles,

varying in number and form. The fore tibia is very rarely modified though in a few forms like *Perissothrips parviceps* H. and *Arrhenothrips ramakrishnæ* H., there is a toothlike projection at the apex. The fore tarsus in a good many forms bears a tooth of varying size and shape; the new species *Mesothrips bhimabahu* and *Brachythrips dantahasta* have prominent foretarsal teeth. The foretarsus bears a claw or tooth also in many *Aeolothripoidæ*, and the new *Adiheterothrips* has a

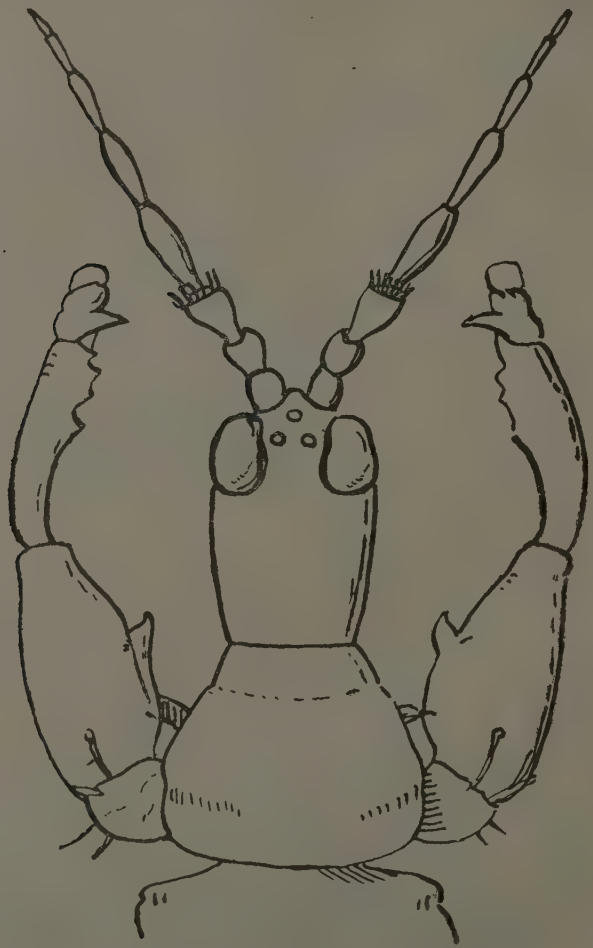


FIG. 8 (*a*). *Ecacanthothrips sanguineus*, B. (From Karny).

Fig. 8 (*b*). *Arrhenothrips ramakrishnæ*, Hd. ♀.

curved hook-like tarsal armature. The tarsus in all *Thysanoptera* has only two joints of which the distal one has a protrusible bladderlike organ; the presence of this structure is another striking feature among these insects, and on this account the group has also been known as the *Physopoda* or "bladder footed". *Wings* are present in most forms and always four in number. These are narrow and kept horizontally back on the abdomen when not in use. The structure of the wings is also peculiar in *Thysanoptera* compared with that of other insects; there are long hairy fringes along the margins and this feature has given them the name *Thysanoptera*, or fringe-winged insects. In *Aeolothripoidea* the wings are

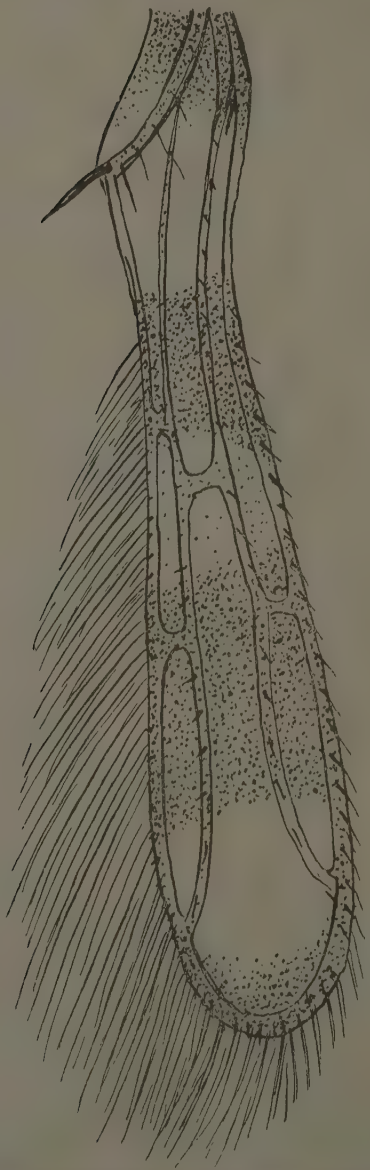


Fig. 9. *Stomatothrips flavus* H., right forewing × 186. A typical Aeolothripid wing. (From Hood.)

broader, roundly curved at the apex, and usually have both longitudinal and cross veins. In the *Thripoidæ* they are acutely or bluntly pointed, and do not have cross veins, but only two longitudinal veins or their vestiges. Along the track of these veins and the costal border are found bristles of varying sizes and numbers. The structure, number and method of arrangement of these wing-bristles are also important in classification. In the *Tubulifera* the wings are more or less broad and rounded at tip, with marginal fringes, and have no veins or setæ. In many Tubulifera the forewings have a few duplicate hairs at the hind border of the apex ; the number of these hairs varies in different species and this variation is often found useful in separating closely related species. At the base of the fore-wing in most tubulifera there are also three strong spines which are pointed or knobbed, straight or curved. Some *Thysanoptera* are wingless, while some possess rudimentary or atrophied wings ; these latter are called *brachypterous* forms as distinguished from *macropterous* or fully winged ones ; and macropterous and brachypterous forms are often found in the same species, as is the case in the new *Thilakothrips babuli*, *Rhynchothrips vichitravarna*, and *Brachythrips perandaphaga*. In some forms either the female, the male, or both, may be wingless and often in the same species there may be brachypterous and macropterous forms of the same sex. Numerous such variations are met with and Trybom [1] classifies them into seven or eight kinds.

The *Abdomen* is the longest region of the body. Though it is apparently made up of ten segments it is actually formed of eleven. De Gryse and Treherne[2], in an interesting paper recently published, have explained this point. While there are evidences of a 11th segment in the Terebrantia, in the Tubulifera the 10th and 11th are fused together. All the segments excepting the last three or four are similar in structure. In the Terebrantia, the females have the terminal segments modified to form the ovipositor and the apex of the abdomen is conical, while in the males the apex is bluntly rounded. In the Tubulifera the females have no ovipositor and in both sexes the last abdominal segment is tubular and is called the "*tube*". The tube is usually shorter than the other segments, but in species of *Gigantothrips* and *Leeuwenia* among Indian forms, it is very long. In the latter it is as long as all the other segments of the abdomen taken together. The abdominal segments and the tube usually bear bristles at the postero lateral margins which

[1] Trybom, F. *Lilljeborgs. Fests Krift*, pp. 213-229, 1896.

[2] De Gryse, J. J. and Treherne, R. C. The male genital armature of the Thysanoptera, *Canadian Entomologist*, pp. 177-181, LVI, 1924.

vary in size and shape ; in addition some tubulifera carry on the abdominal tergites two pairs of wing retaining bristles which are often sigmoid in shape.

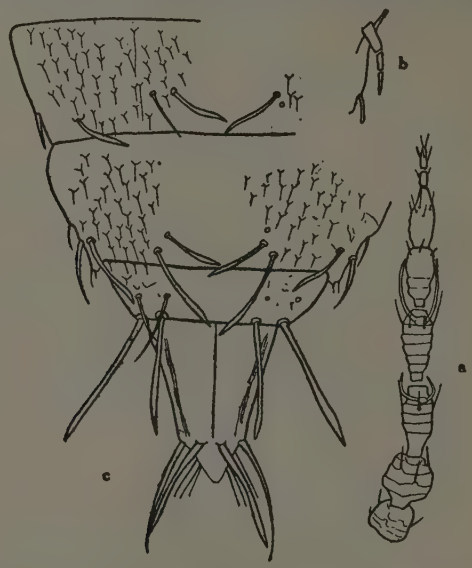


FIG. 10 (*a*). *Tryphactothrips mundus*, Karny ♀ ; *a* antenna ; *b* palpi ; *c* end of abdomen.

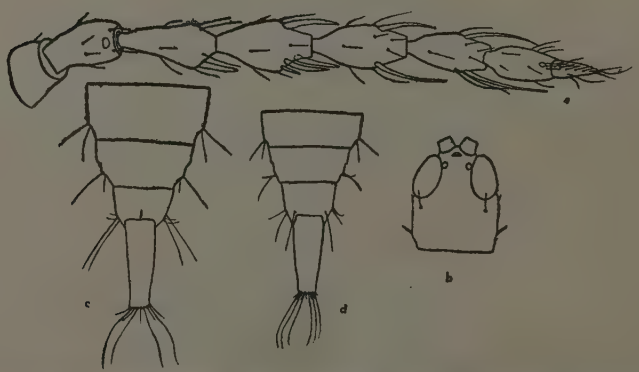


FIG. 10 (*b*). *Ramakrishnaiella unispina*, Karny. *a* antenna ; *b* head ; *c* and *d* end of abdomen ; *c* ♀, *d* ♂. (From Karny.)

In *Thysanoptera* three or four pairs of spiracles are usually found, one or two on the thorax, one on the first abdominal segment, and one on the eighth abdominal segment.

The body integument in the *Thysanoptera* is sufficiently well developed and hard. In many species transverse or longitudinal striations are found, especially the former ; and these striations are often conspicuous on the head and thorax. In the Heliothripinæ and a few other Terebrantia the striations are not only more strongly developed but even become reticulated or net like all over the body surface. In the Tubulifera such a net like formation of the body surface is very rare. It is however found in the new genus *Thilakothrips* where the whole body and especially the tube shows a reticulated surface. The pigmented colors are usually yellow, brown, red, grey, or mixtures of these, but never metallic. As has been noted before, the different regions of the body in many forms bear integumental appendages of different kinds such as spines, bristles, hairs, warts, tubercles, etc., of varying shapes and sizes, and on the antennæ are found sense organs of different kinds.

The sexes can easily be identified in the case of the *Terebrantia* in which the females possess an ovipositor ; this is generally curved upwards as in the *Aeolothripoidea*, or curved downwards as in the *Thripoidea*. In the *Tubulifera* the determination of the sexes is often difficult, since the females have no ovipositor. Instead, they have, on the median line just above the base of the tube, a small chitinous rod, and in the males the base of the tube, which is entire in the females is pushed backwards into the tube as a pouch. These sexual structures of the females and the males can only be seen through the integument in light colored or transparent forms ; but in dark or opaque species it is difficult to see them. Some of the secondary sexual characters noted among these insects are the more strongly developed fore femora, the foretarsal tooth, thinly chitinised transverse areas on some of the abdominal sternites of some forms, a small strong spine near each of the long lateral bristles of the 9th abdominal segment in male *Tubulifera*, and the comparatively small size of the males.

Life history.

The *Thysanoptera* usually reproduce sexually and are oviparous. In some species agamogenesis is found to occur and this evidently accounts for the fact that in some forms the male is unknown. O. John [1] in a paper published in 1923 suggests that there is some evidence of the existence of viviparous forms in *Thysanoptera*. The members of the group Terebrantia thrust their eggs into soft vegetable tissue by means of the ovipositor, while the Tubuliferous forms, in the absence of such an organ, deposit the eggs loosely inside leaf sheaths, flowers, buds or under bark. The newly-hatched larva is soft, fairly active, and possesses the

[1] John, O. Fucultative viviparitat bei Thysanopteren. *Ent. Mittile*, XII, p. 227, 1923.

same feeding habits as the parents. Development takes place with a partial metamorphosis and four instars are passed before reaching the adult condition. The

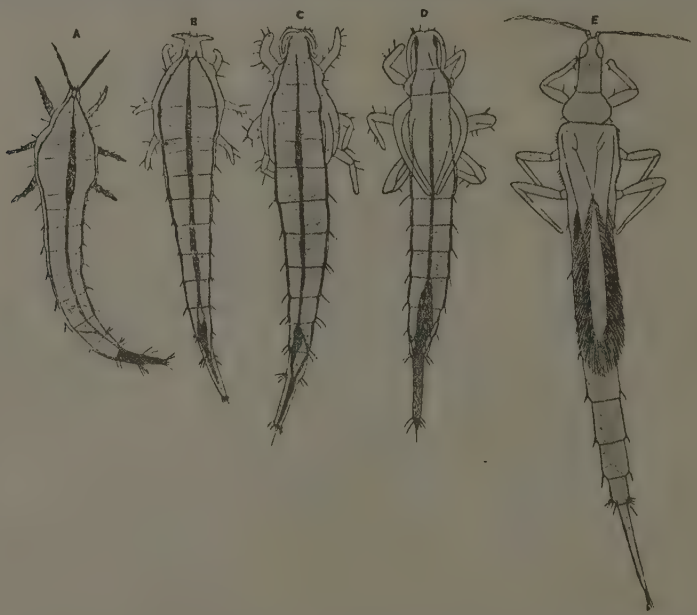


Fig. 11. *Gigantothrips elegans*, Z. larval stages and adult (adapted from Karny and Docters).

first two are larvæ without signs of wings, the third instar (called the ' prepupal ' stage) shows wing-pads. The next moult changes the larva into a partially quiescent stage with long wing-pads and the antennæ kept backwards over the sides of the head ; this stage more or less corresponds to the ' pupa ' of insects passing through a regular metamorphosis. After the next moult the insect reaches the adult condition. In the case of some species the insect hibernates or aestivates in the soil or parts of plants in one stage or other for long periods. The complete life history of no Indian species has yet been studied by the writer, though larval stages of some forms have been noted. Some of these larvæ are very pretty, clothed in bristles and colored in different patterns. The greenhouse thrips, *Heliothrips hæmorrhoidalis*, B., *Gigantothrips elegans*, Z., and *Selenothrips rubrocinctus* G. are examples of such forms in India. There is no doubt that the study of the life histories and the structural peculiarities of the larval forms would greatly help us in finding out the true affinities of many species. Due to their small size, and delicate body, it is found rather difficult to study their life history and habits

FIG. 12. Thrips, Tubulifera—adult and earlier stages. (From Lefroy).

in nature except under very favourable conditions. Among those who have contributed to the study of the earlier stages of *Thysanoptera* Dr. Priesner is well known and has published some very interesting papers [1] on this subject.

FOOD, HABITS, AND NATURAL ENEMIES.

The great majority of *Thysanoptera* are plant feeders, and as such are chiefly found on the softer tissues of various plants such as flowers, shoots, buds, tender leaf sheaths and leaves, and often under bark. In almost every kind of flower one usually finds some species or other of Thrips. The method of feeding consists in puncturing the soft and sappy portions of vegetable tissue and sucking up the juice. This drainage in plant sap causes different kinds of injury to different plants; in some the leaves curl or roll up, in others the flowers fade and drop prematurely and in some others the shoots and buds wrinkle and fade. There are some forms, especially among the Tubulifera, which cause abnormal growths on plant tissue called galls. The important publication [2] by Karny and Reijnvaan on Javanese

[1] PRIESNER, H. Immature stages of Malayan Thysanoptera, *Treubia* VIII—
(*a*) 'Bernstein Thysanoptera,' *Entom. Mitt.* XIII, p. 130, 1924.
(*b*) Die 'Thysanopteren Europas', 1926.
(*c*) Thysanoptera of Dampfs Egyptian Collection, *Ent. Mitt.* XII, 1923.
(*d*) On the genus 'Haplothrips', *Treubia*, II, 1921.

[2] KARNY, H. AND REIJNVAAN, D. V. L. Beitrage zur Kenntnis der Gallen von Java, etc., *Bulletin de Jardin Botanique de Buitenzorg*, No. X, 1913.
(*a*) Beitrage zur Kenntnis der Gallen von Java, etc. Ztschr. *Wils. Insektenbiol.*, X-XII, 1914-1916.

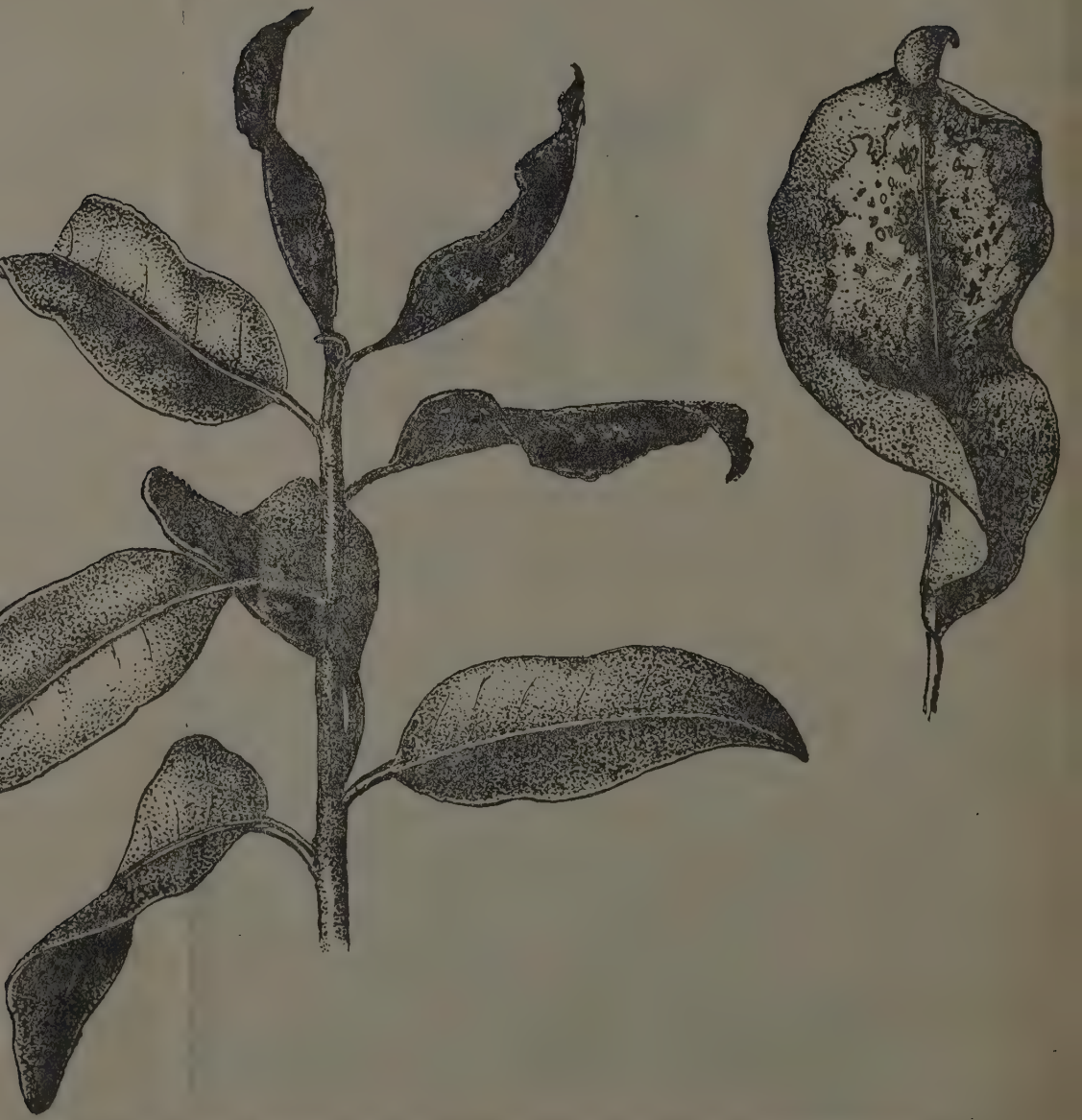


FIG. 13 (*a*). Galled foliage of Mimusops *elengi* caused by *Arrhenothrips ramakrishnai* H. and *Rhynchothrips vichitravarna* n. sp.

FIG. 13 (*b*). Large gall on *Calycopteris floribunda* caused by *Austrothrips cochinchinensis*, K.

gall Thrips and their galls gives a very interesting account of this aspect of the activity of *Thysanoptera*. In India a few species have been noted as gall makers, the chief among them being the species of *Austrothrips*, *Brachythrips*, *Mesothrips*, *Trichothrips*, *Cecidothrips*, *Arrhenothrips*, *Rynchothrips*, *Androthrips*, *Eothrips*, and *Thilakothrips*, and the plants chiefly concerned are species of *Calycopteris*, *Ficus*, *Memexylon*, *Eugenia*, *Mimusops*, *Pothos*, *Mallotus*, and *Acacia*. The formation and structure of the galls caused by different species on their plant hosts vary remarkably, and often more than one species live in the same gall. Only a very small number of the gall-making forms has been so far collected and studied in India ; further collections and studies of such galls and their Thysanopterous inhabitants would be found to afford ample material for a special theme. Though some species are found feeding on more than one plant, many forms confine themselves exclusively to one kind of food plant.

While most *Thysanoptera* are phytophagous there are some which have been noted to be carnivorous, feeding on eggs of small creatures, minute insects, and mites. The well-known predatory species *Scolothrips sexmaculata*, P., has been found in India feeding on mites infesting the *sorghum* plant, and another new species, *Anaphothrips fungivora*, has been noted to feed on rust found on wheat. In Florida the species *Aleurodothrips fasciapennis*, F., is known to feed on White-flies and larvæ of Scale insects. Williams [1] has recorded in 1921 the blood-sucking habit

[1] WILLIAMS, C. B. A blood sucking thrips. *Entomologist*, LIV, p. 163, 1921.

of a Thrips (a tubulifera) in Trinidad and in 1922 Senevet [1] has noted that the species *Gynaikothrips uzeli*, Z., attacks man in Algiers. No such special habits have been noted by the writer.

With regard to the different habits of *Thysanoptera* very little is known. Some Indian species such as *Mycterothrips* and *Perissothrips* exhibit powers of leaping, while many forms, especially among the Tubulifera, have the habit of raising the tail end of the body vertically when disturbed, just like some staphylinid beetles. This has been noted in the Indian form *Kleothrips subramanii*, R., during intervals of sexual union. In this species and in *Leeuwenia karnyi*, R., the mother insect broods over the eggs for a long time almost until the latter hatch out. Two articles [2] published by Dr. Shull in 1914 on the biology of *Thysanoptera* contain some interesting facts dealing with the life history, sex relations, and tropisms of these insects. Howlett, who has tried numerous experiments in India to study the chemotropisms of various insects, gives an account of his trials to trap Thrips with different aldehydes—such as Benzaldehyde, Anisaldehyde, Cinnamyl dehyde, etc., in an interesting paper [3] published in 1914.

The natural enemies of *Thysanoptera* so far known are the larvæ of Chrysopids, Syrphidæ, Coccinellidæ, Spiders and species of Anthocorid bugs. In India the

Fig. 14. Predatory bug. *Montandoniola thripodes*, Berg.

[1] Senevet, G. Presence a Alger d'un Insecte fort genant pour l'Homme. *Bulletin Soc. Hist. Nat. Alger*, XIII, pp. 97-98, 1922.

[2] Shull, F. Biology of the Thysanoptera, *American Naturalist*, XLVIII, pp. 161-176 and 236-247, 1914.

(*b*) Some apparently new Thysanoptera from Michigan, *Entom. News*, XX, pp. 220-228, 1909.

[3] Howlett, F. A trap for thrips. *Journal of Economic Biology*, IX, p. 21, 1914.

author has noted the Anthocorid, *Montandoniola thripodes*,* B. (fig. 14) feeding on the different stages of the species *Arrhenothrips ramakrishnæ*, H. The existence of an internal parasite of *Thysanoptera* was first noted by Del Guercio [1] of Italy in 1917. He found the small Chalcid wasp, *Tetrastichus gentilii*, parasitising the Olive Thrips, *Phlœothrips oleæ*, T. In 1912 Russell [2] reared out another Chalcid, *Thripoctenus russelli*, C., from the Bean Thrips, *Heliothrips fasciatus*, P., in California. No such parasites have yet been found in India. Besides these insect enemies, some species are found to be subject to attacks of fungi; the author has found some specimens of one or two Indian species completely overgrown and enveloped with the hyphæ and spore buds of some fungus.

Economic status.

At present the economic role played by *Thysanoptera* in India is not as important as it is in other countries, but their plant-inhabiting habits certainly indicate possibilities of some of them becoming economically important and attracting attention under favourable conditions. The only records we had previously of injurious *Thysanoptera* that were definitely identified were of *Panchœtothrips indicus*, B., causing injury to the turmeric crop (*Curcuma longa*) in Madras in 1889 and the two forms, *Physothrips setiventris*, B., and *Haplothrips tenuipennis*, B., doing appreciable damage to tea in Assam in 1918. With regard to the former there has been no further appearance of the insect as a serious pest since the first report; but the two species on tea have been doing some damage since then, although control measures have been checking their injuries to some extent. Lefroy [3] records two species of Thrips on pulse crops, one on opium, and one on sann hemp (*Crotalaria juncea*), but these were not identified. We have also other indefinite statements in some official reports of Thrips attacking cabbage and onion in Bombay, and lucerne in Baroda. However, since the author began work on these insects he has come across a few forms which, in his opinion, possess potentialities to become economically important under favourable conditions. The most important of these are (1) the rice thrips, *Thrips oryzæ*, W; this insect has attracted some attention in recent years in different parts of South India such as Tanjore, Coimbatore, and Mysore as a fairly serious pest on rice seedlings. (2) *Heliothrips indicus* B., noted as injurious to cabbage and potato in Bombay, to onion in parts of Northern Circars, and to a small extent to 'ragi' (*Eleusine coracana*) and groundnut in South India; (3) *Scirtothrips dorsalis*, H., as a fairly serious pest on chillies (*Capsicum* sp.) in Guntur and surrounding tracts; (4) *Rhipiphorothrips cruentatus*, H., as injurious to grape leaves, roses and other plants in different parts of India; (5) *Heliothrips hæmorrhoidalis*, B., the well-known greenhouse thrips found as a bad pest on garden crotons in Bangalore and Coimbatore; and (6) *Tæniothrips*

* This bug was kindly identified for the author by the Imperial Bureau of Entomology, London.
[1] Guercio, G. *Redia*, VIII, p. 294, 1911.
[2] Russell, H. M. *Bull. 23, Ft. 11, Tech. Series, U. S. Dept. Agr.*, 1912.
[3] Lefroy, H. M. Indian Insect Life; Calcutta, 1909.

distalis, K., and *longistylus*, K., of the same genus as the American "pear thrips" found very commonly on some important leguminous crops such as lab-lab, groundnut, pigeon pea, etc. Others have been noted on such plants as *Citrus* spp., castor, sugar-cane, gingelly and cereals like *cumbu* (*Pennisetum typhoideum*), maize and *sorghum*, but not to such extent as the half-dozen noted above. The onion thrips of America, *Thrips tabaci*, L., has since been found in India, though not as a serious pest, and the insect found on the cereal *cumbu* is one closely related to the American grass thrips, *Anapothrips striatus*, O.,[1] known to cause sterility in oats. Almost all the injurious forms so far found affecting cultivated crops in India belong to the *Terebrantia*, the only injurious ones known affecting cultivated plants among the *Tubulifera* being the Tea Thrips, *Haplothrips tennipennis*, B., of Assam, and *Arrhenothrips ramakrishnæ*, H., damaging the garden plant, *Mimusops elengi*, in South India. These records are evidences to show that there exist in the country species which may prove harmful at any time, and as such, a previous knowledge of these insects may be of some help to the future economic entomologist.

Very little is definitely known in India as to whether any of the *Thysanoptera* are useful in effecting flower pollination in any plants of economic importance.

Distribution, affinities and means of dispersal.

As far as known very few *Aeolothripoidea* have been recorded from India compared to many *Thripoidea*; the former appear to be commoner in the new world. Nor have we as yet found in India representatives of the families *Merothripidæ*, *Pygothripidea*, *Eupathithripidæ*, *Chirothripidæ*,* or the *Urothripidæ*. Among the cosmopolitan species found in India are *Heliothrips hæmorrhoidalis*, B., *Scolothrips sexmaculata*, P., *Limothrips cerealeum*, H., and *Gynaikothrips uzeli*, Z., species which have been noted almost all over the world. The genera well represented are *Tæniothrips* and *Thrips* among the Terebrantia, and *Haplothrips*, *Neoheegeria* and *Gynaikothrips* among the Tubulifera. The great bulk of the Indian forms noted so far show affinities to African and Malaysian species, though a few appear to be peculiar to India; among the latter are the genera *Panchætothrips*, B., and *Cecidothrips*, K. The existence of forms like *Hydatothrips*, *Tryphactothrips*, *Mycterothrips*, *Kleothrips* and *Eurhynchothrips* show African affinities, while the presence of species of *Isoneurothrips*, *Rhipiphorothrips*, *Leeuwenia* and *Gigantothrips* clearly point out relations to the thysanopterous fauna of South-eastern Asia. Among the species that are commonly met with both in India and Malaysia may be mentioned *Tæniothrips distalis*, K., *Tæniothrips longistylus*, K., *Isoneurothrips orientalis*, B., and *Dinothrips sumatrensis*, B.

Till now fossil Thysanoptera have not been discovered either in India or any other Asiatic region, though some have been found in parts of America and Europe.

[1] O'Gara. Sterility in oats caused by Grass thrips, *Bull. Amer. Smelt. Ref. Co.*, 1915.

* Since submitting this paper for publication the author has come into possession of specimens of *Chirothrips* from Coimbatore.

Based on the geographical distribution and general structural features of the extinct and living forms, it has been concluded by some authors that the " Thysanoptera originated in or near the tropics of the New World," and spread to other countries, gradually undergoing evolutionary changes in general form from the ancestral *Aeolothripoid* forms, through the *Thripoidea* on to the more highly organised *Tubulifera*. Unlike as in the neotropical regions, species of *Aeolothripoidea* appear to be very rare in India, and as such considerable weight should be attached to such a conclusion. However, the recent discovery of two *Aeolothripoidea* (*Aeolothrips fulvicollis* B., in 1919, and *Orothrips, racensis* M., this year) naturally raises up some doubt as to the original home of the ' Prothysanopteron ' ancestor of the order. Further collections and investigations may help us considerably in this direction.

There are various ways in which *Thysanoptera* get dispersed; the frequent transportation of plants, nursery stock, flowers and fruits from place to place plays a very important part in the dispersal of these small insects. Other agents that aid their wide dissemination are birds and flower-visiting insects, which often carry these tiny insects in their bodies to long distances. Logs of wood floating down rivers also help in carrying bark infesting species from one place to another. In these days of frequent and easy transportation of plants, shrubs, etc., by human agency, it is very easy for such small forms of life to get widely distributed.

CLASSIFICATION.

The order *Thysanoptera* is primarily divided into two distinct suborders, *Terebrantia* and *Tubulifera*, based mainly on the differences in the structure of the last abdominal segment and the wings. Some of the important characters that are taken into consideration in the classification of this group into families, subfamilies, and genera are the structural peculiarities of the wings, the antennæ, the mouth cone, the last abdominal segment, and the maxillary palpi, and the comparative sizes of the different parts of the body, such as head, thorax, antennæ and tube. The following table gives the classification of the order into families as far as the Indian forms of the group are concerned. This table is adapted from Karny's key [1] which was partially translated and published by the author in 1925.[2]

KEY TO THE SUBDIVISIONS AND FAMILIES OF INDIAN THYSANOPTERA.

1. Female with an ovipositor formed of two pairs of gonapophyses from 8th and 9th abdominal segments. Terminal abdominal segment seldom tubular, that of female longitudinally divided beneath and usually conical, that of male usually bluntly rounded, never tubular. Wings microscopically pubescent; forewing with marginal vein and at least one longitudinal vein reaching tip . . . .
SUB-ORDER . . . . . TEREBRANTIA

[1] Uzel, H. Monographie d. ord. *Thysanoptera*, 1895
[2] *loc. cit.*

A. Ovipositor curved upward. Wings broad and rounded at tip. Body not depressed. Antennæ nine-jointed . . . . . Super-family . . . . . ÆOLOTHRIPOIDEA, Hood*
Includes only one family—*Aeolothripidæ*, Uzel . . . .

B. Ovipositor curved downward. Wings narrower and almost always pointed at tip. Body more or less depressed. Antennæ six to eight jointed, exceptionally nine jointed . . . . . Super-family . . . . . THRIPOIDEA, Hood

(*a*) Antennæ nine segmented, without apical stylus, 3rd and 4th segments enlarged and conical without sense cones but with sensory band at apex. Fore tarsus with clawlike appendage. Family . . . . . *Heterothripidæ*, Bagnall

(*a*^{1}) Antennæ six to eight segmented, usually with an apical stylus of one or two segments, rarely the 6th segment with a transverse line making the antennæ appear nine segmented. Segments 3 and 4 not conical, usually with sense cones, rarely with a sensory band at apex. Fore tarsus never with an appendage . . . . . .

(*b*) Last abdominal segment of female conical, not well chitinized, seldom stronger than the preceding segments, bristles on segments 9 and 10 not very long or stout, never thornlike . Family . . . . . *Thripidæ*, Uzel

(*b'*) Last abdominal segment of female cylindrical, very heavily chitinized, bristles on 9 and 10 segments exceptionally long, stout and thornlike . . . . . Family . . . . . *Panchætothripidæ*, Bangall

II. Female without ovipositor. Last abdominal segment in both sexes always continuous beneath, almost invariably tubular. Wings without pubescence, forewing with at most a single abbreviated median vein . . . . . SUB-ORDER . . . . . TUBULIFERA

(*a*) Tube (last segment) much shorter than the remaining segments together . . . . . .

(*b*) The third segment of antennæ with strong crestlike large sense cones at its distal part . . . . . Family . . . . . *Ecacanthothripidæ*, Bagnall

(*b*^{1}) Sense cone of third antennal segment not more strongly developed than in the other segments . . . . . .

(*c*) Head not produced in front of the eyes, vertex not sharply conical, rarely prominently overhanging base of antennæ . Family . . . . . *Phlœothripidæ*, Uzel.

(*c*^{1}) Head more or less produced in front beyond the eyes, vertex conical, usually overhanging base of antennæ, bearing the anterior ocellus at its extremity and usually with a strong bristle in front of the eye . . . . . Family . . . . . *Idolothripidæ*, Bagnall

(*a*^{1}) The tube greatly elongate, three or four times as long as the head, and nearly as long as the other abdominal segments together . . . . . Family . . . . . *Hystricothripidæ*, Karny

SYSTEMATIC ACCOUNT OF INDIAN THYSANOPTERA.

In the following account are included all species of Thysanoptera recorded from India till now, with descriptions of some of the new forms recently noted. In the author's accumulated material there are found many more forms which are probably new but which demand further investigations before they are treated as

* Bagnall has recently (*5g*) (1926) divided up this group into four families—*Aeolothripidæ*, *Oro-Thripidæ*, *Melanothripidæ* and *Franklinothripidæ*.

such and their descriptions published. In this publication, therefore, only those, which in the opinion of the writer, appear to be novelties have been included, the others being reserved for future papers.* Foremost among the genera which are very commonly found in India, each including numerous very closely allied species and which stand in need of further studies for generic and specific revision, are *Thrips*, *Tæniothrips*, *Anaphothrips*, *Haplothrips* and *Gynaikothrips*.

List of New Forms described in this Paper.

TEREBRANTIA.

1. *Adiheterothrips jambudvipæ*, n. g. & sp.
2. *Rhipiphorothrips karna*, n. sp.
3. *Tæniothrips jonnaphila*, n. sp.
4. *Tæniothrips pingala*, n. sp.
5. *Thrips pandu*, n. sp.
6. *Thrips nilgiriensis*, n. sp.
7. *Anaphothrips fungivora*, n. sp.

TUBULIFERA.

1. *Thilakothrips babuli*, n. g. & sp.
2. *Arrhenothrips dhumrapaksha*, n. sp.
3. *Rhynchothrips raoensis*, n. sp.
4. *Rynchothrips vichitravarna*, n. sp.
5. *Liothrips kiriti*, n. sp.
6. *Liothrips palasæ*, n. sp.
7. *Gnophothrips kabandha*, n. sp.
8. *Neoheegeria hrisvamukha*, n. sp.
9. *Zygothrips andhra*, n. sp.
10. *Brachythrips dantahasta*, n. sp.
11. *Brachythrips dirghavadana*, n. sp.
12. *Brachythrips perandaphaga*, n. sp.
13. *Eothrips aswamukha*, n. sp.
14. *Eothrips coimbatorensis*, n. sp.
15. *Eothrips jambuvasi*, n. sp.
16. *Gynaikothrips malabarica*, n. sp.
17. *Gyanikothrips moultoni*, n. sp.
18. *Ramakrishnaiella nirmalapaksha*, n. sp.
19. *Mesothrips bhimabahu*, n. sp.
20. *Eugynothrips priesneri*, n. sp.
21. *Mallothrips indica*, n. g. & sp.

Sub-order TEREBRANTIA.

Synoptical Key to the Terebrantia known from India.

I. Wings broad and round at apex, antenna 9 jointed, ovipositor curved upwards . . . . . .

(*a*) All antennal joints freely movable; max. palpi with 7 or 8 joints, wings with dark transverse bands . . . . . OROTHRIPS, Moulton

(*aa*) 4 or 5 terminal joints of antenna united . . . . AEOLOTHRIPS, Haliday

II. Wings narrower and almost always pointed at apex, ovipositor curved downwards; antenna usually 6-8 jointed, rarely 9 jointed . .

A. Antenna distinctly 9 jointed . . . . . ADIHETEROTHRIPS, *n. gen.*

AA. Antenna 7 or 8 jointed, usually with an apical style of two joints.

B. Last abdominal segment of female conical, not strongly chitinised, and bristles on 9th and 10th segments not very stout or thorn-like.

(*a*) Head and surface of body with net like structure, having definite polygonal areas, or dense wrinkles . . . .

(*b*) Head and prothorax with wrinkled frilled margins . . TRYPHACTOTHRIPS, Bagnall

(*bb*) Head and prothorax without such structure . . .

(*c*) Vertex between antennæ broadly rounded, and dorsal surface with only wrinkles, no polygonal areas . . . RHIPIPHOROTHRIPS, Morgan

(*cc*) Vertex narrow; dorsal surface of head with distinct polygonal areas . . . . . HELIOTHRIPS, Haliday

* Since submitting this paper for publication, the author has added to his collection further novelties, among which are species of Erythrothrips, Chirothrips, Heliothrips, Selenothrips, Scirtothrips, Mycterothrips, Reticulothrips, Oxythrips, Taeniothrips, Fulmekiola, Thrips, Liothrips, Euoplothrips, and Haplothrips, all from S. India.

(*aa*) Head never, and body rarely, with net like sculpture . .
(*d*) Body with fine microscopic hair, and wings often with only one vein . . . . . SCIRTOTHRIPS, Shull.
(*dd*) Body without microscopic hair, and wings usually with two veins . . . . . .
(*e*) Apex of abdomen with strong spines, much stronger than the ordinary long abdominal bristles . . LIMOTHRIPS, Haliday
(*ee*) Apex of abdomen without strong spines, only with more or less long bristles . . . . . .
(*f*) Antenna 8 jointed . . . . . .
(*g*) Prothorax without especially strong bristles .
(*h*) Prothorax with net sculpture at sides and front HYDATOTHRIPS, Karny
(*hh*) Prothorax with no net sculpture . . .
(*i*) Maxillary palpi 2-jointed . . . . DENDROTHRIPS, Uzel
(*ii*) Maxillary palpi 3-jointed . . . .
(*j*) Last abdominal segment long and stout and with strong bristles; wings apparently veinless and spineless . . . . DENDROTHRIPOIDES, Bagnall.
(*jj*) Last abdominal segment not so stout .
(*k*) Ocelli large and wings present . . ANAPHOTHRIPS, Uzel
(*kk*) Ocelli and wings absent, or atrophied . APTINOTHRIPS, Haliday
(*gg*) Prothorax at least at hinder margin with one or two long bristles . . . . . .
(*l*) Prothorax with one bristle at hinder border . PERISSOTHRIPS, Hood
(*ll*) Prothorax at hinder margin with two long bristles on each side.
(*m*) Mouth cone long and narrow extending to mesosternum . . . . . MYCTEROTHRIPS, Trybom
(*mm*) Mouth cone not noticeably long and narrow
(*n*) 3rd and 4th joints of antenna with forked sense cones . . . . . TÆNIOTHRIPS, Serville
(*nn*) 3rd and 4th joints with simple sense cones and body small . . . . . BREGMATOTHRIPS, Hood
(*lll*) Prothorax at each front angle with one, and at each hind angle, with two long bristles .
(*o*) Prothorax with also a lateral bristle . SCOLOTHRIPS, Hinds.
(*oo*) Prothorax without a lateral bristle . .
(*p*) Maxillary palpus 3-jointed . . . FRANKLINIELLA, Karny
(*pp*) Maxillary palpus 2-jointed . . . AYYARIA, Karny
(*ff*) Antenna 7-jointed . . . . . .
(*q*) Both long veins of fore wing set with bristles along entire length . . . . . ISONEUROTHRIPS, Bagnall
(*qq*) Both the veins not regularly set with bristles .
(*r*) Prothoracic bristles very small . . . RAMASWAMIAHIELLA, Karny
(*rr*) Prothoracic bristles not small . . .
(*s*) Abdominal segments with transverse apical fringe . . . . . STYLOTHRIPS, Karny (MICROCEPHALOTHRIPS).
(*ss*) No fringe except sometimes on 8th segment . THRIPS, Linnæus

BB. Last abdominal segment of female cylindrical and strongly chitinised, bristles on 9th and 10th segments very strong, long and thorn like; costal spines of wings very strong . . . .

(*t*) Body with net sculpture in parts, and prothorax with lateral frills . . . . . TRYPHACTOTHRIPS,* Bagnall

(*tt*) Body without net sculpture and the prothorax without frills .

(*u*) 10th abdominal segment long and strong . . . . PANCHÆTOTHRIPS, Bagnal

(*uu*) 10th segment very short and weak . . . . . BRACHYUROTHRIPS, Bagnal

Family AEOLOTHRIPIDÆ.

OROTHRIPS, Moulton.[1] (*Tech. Bull. 12, U.S.A. Dept. Agr.*, 1907, p. 45.)

Orothrips raoi, Moulton

(*Bull. Brook. Ent. Soc. XXII, 1927, p. 184.*)

Hab. and Loc. in some unknown flower; Bangalore, S. India. (*A. Rao* Coll.)

This is a recent record from India and the description of the species was very recently [2] published by Mr. Moulton. Very similar to *O. yosemitei*, M. It is the second *Aeolothripoid* for India, the first being *Aeolothrips fulvicollis*, B., described in 1919.

Since submitting this paper to the press the author has come into possession of two more forms of this interesting family.

AEOLOTHRIPS, Haliday.[3] (*Ent. Mag.* III, 1836, p. 451.)

Aeolothrips fulvicollis, Bagnall. (*A.M.N.H.* (9), IV, *1919*, p. 253.)

Hab. and Loc. in *Verbascum* flowers, Cawnpore, N. India, (*Imms* Coll.), Dehra Dun (*Gardner* Coll.). Since noted in mango flowers, Pusa., (D.P.S. Coll.) This was the first record of an *Aeolothripid* from India.

Family HETEROTHRIPIDÆ.

ADIHETEROTHRIPS, new genus.

Head slightly broader than long; antennæ 9-jointed, joints 3 and 4 though somewhat broader towards apex, are not conical and have no sensory bands as in *Heterothrips*, Hood,[4] but instead, at the outer side of the apex of each of these there is a short two jointed hyaline sense cone; the basal joint of this structure is

*This genus might also be brought near '*Heliothrips*' on account of the reticulate net-like structure of body surface.

[1] MOULTON, D. *Bulletin No. 12, Tech. Series, U. S. A. Dept. Agr.*, 1907.

[2] Bulletin of the Brooklyn Entomological Society XXII, 1927, p. 184.

[3] HALIDAY, A. H. An Epitome of the British genera of Thysanoptera. *The Entomological Magazine*, London, III, pp. 439-451, 1836.

[4] *loc. cit.*

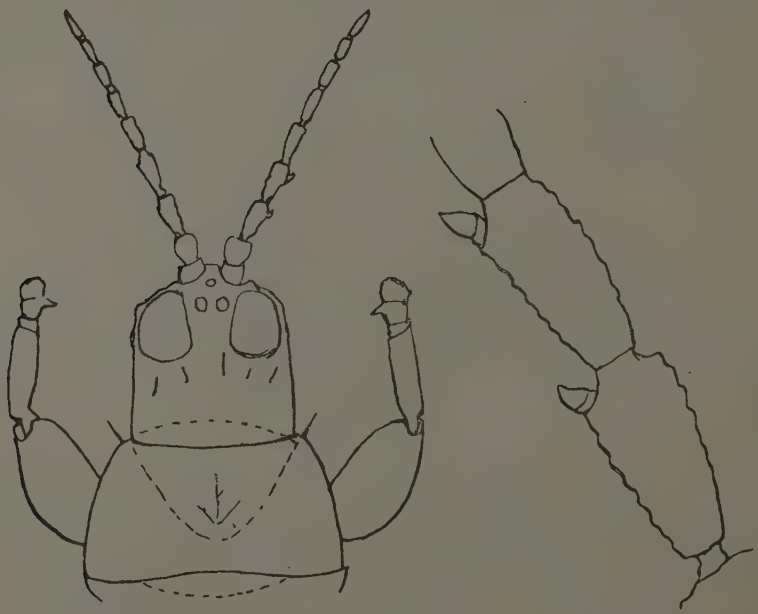
small and broader than long, while the distal one is in the form of a leaf like broad cone; the latter is also much more hyaline and clearly seen only in certain lights.

Maxillary palpi with more than 4 joints; ocelli clear; fore tarsus with a curved tooth at the apex of basal joint. Wings well developed, with the two long veins of the forewings clear and bearing setæ. Abdomen broadly oval, broader than metathorax; tenth segment short and more or less tubular. Ovipositor well developed and curved downwards.

Type A. *jambudvipæ*.* n. sp.

The narrowly pointed wings, the structure of the ovipositor, and the nine segmented antennæ undoubtedly bring this insect into the family *Heterothripidæ*, and its unique features clearly separate it from the only other living genus in the family, *Heterothrips*, Hood. The striking differences are the shape of the 3rd and 4th antennal joints and the structure of their sense cones.

This is the first "Heterothripid" genus to be recorded from the Old World.



(1) Anterior part of insect. (2) 3rd and 4th joints of antenna.

FIG. 15. *Adiheterothrips jambudvipæ* n. g. and sp.

* *Jambudvipa*, is one of the ancient names of India.

Adiheterothrips jambudvipæ. n. sp.

Macropterous female. Length 1·25 to 1·35 mm. Color greyish brown with an ochraceous tinge over the thorax and the posterior region of abdomen, greater part of the latter of a dark grey tinge, almost dark brown in some specimens. Eyes dark; ocelli with bright red pigment cups. Antenna: 1st joint concolorous with head, 2nd greyish white, 3rd very light almost yellowish white, 4th slightly deeper, 5th to 9th pale grey. Legs: pale grey with a touch of light yellow, especially over the fore legs and the tibiæ and tarsi of the other legs. Wings clouded, with light grey infumation; the basal third of forewing somewhat clear and the extreme edge of the base greyish.

Head a little wider than long, the vertex produced forwards very slightly into small process between the bases of the antennæ, which are situated almost at the front margin of it. Eyes large and almost spherical, a little shorter than half the length of the head, space between them equal to width of an eye. Ocelli clear, the posterior ones larger than front one and situated over a line across middle of eyes, the front one situated just below the conical projection of the vertex; cheeks diverging towards base where the head is broadest, very slightly crenulate, and with a few minute colorless bristles. Surface of occiput with distinct, though weak, transverse striæ; no post-ocular bristle; a few small isolated bristles on vertex. Mouth cone broadly rounded with the upper lip slightly pointed and extending to the middle of prosternum; maxillary palpus large with 5 joints. Antennæ long and filamentous, a little more than twice the length of the head, all the joints distinct; 1st joint very broad and cup shaped, 2nd elongate oval and broader towards apex; 3rd longest of all, vase shaped with a distinct constriction at base and broadening towards middle; 4th, 5th and 6th subequal and more or less like 3rd; 3rd to 6th with the margins wavy, 5th somewhat narrow at base and cylindrical; 7th and 8th elongate cylindrical broadening towards apex; 9th longer than 8th and of almost uniform width throughout. At the outer side of the apex of the 3rd and 4th is a two jointed sense cone described under genus; 5th-8th with ordinary narrow sense cones.

Prothorax almost as long as head, very little shorter if at all; more than 1·5 times as broad as long, more or less oval in shape with the sides distinctly arched; no conspicuous bristles; one very short light colored pointed spine at each anterior lateral angle and a few minute bristles on the tergum. The pterothorax with the sides constricted at the middle and more or less escutcheon shaped. Legs: Fore legs strongly developed, femur stout and incrassate with the outer margin convex and very faintly crenulate, but not armed with bristles or spines; fore tarsus with a claw-like tooth at apex of basal joint. Hind tibia with two strong apical spurs. Wings well developed and extending to 8th abdominal segment, bluntly pointed at apex, the costa with 30-35 setæ, upper vein 18 to 20, and the lower 15; the setæ are longer and stronger towards apex, fringes longer and more numerous along hind margin.

Abdomen broadly oval, broadest at the 4th segment and broader than pteothorax at that region, terminal segment very short, the 9th segment being 1·5 times longer. Posterior margins of abdominal segments 2-8 with a fine transverse fringe of hairs, clearer at the sides of the segment; on the fringe are also minute sharp spines at intervals. The 9th segment has a transverse row of 8 long spine like bristles just in front of its posterior margin; of these the median two, *viz.* one on each side of the median line, are slender, the pair next to this is the longest and more conspicuous and posteriorly extends to the tip of the abdomen; the 3rd pair is also slender, the 4th or outer pair is strong and long and situated just a little above the median pairs. In addition, there is at the central region of the segment one strong medium sized bristle situated on each side of the median line. The 10th segment has one long conspicuous bristle on each side of the middle line. Ovipositor very conspicuous and long.

Measurements of holotype female. Length 1·35 mm., Head length ·125 mm. breadth ·150 mm., Prothorax length ·122 mm., breadth ·187 mm; Pterothorax width ·280 mm.; Antenna length ·315 mm.; Antennal joints in μ I 18 II 31 III 50 IV 43 V 40 VI 43 VII 34 VIII 25 IX 31.

Described from ten females (no males found) collected by the author from the flowers of the Indian date palm (*Phœnix dactylifera*) at Nayudupetta near Madras; (No. 117).*

The existence of such an interesting insect in India shows that the connecting forms between the *Thripoidea* on the one hand and the *Aeolothripoidea* on the other are also found in the Old World. One striking fact in the structure of this insect which shows it to be a very ancient one is the form of the sense cone on the 3rd and 4th antennal joints; this structure is almost like those of the fossil Aeolothripid *Opadothrips*† described by Priesner from baltic amber (Tertiary).

Family THRIPIDÆ.

Limothrips, Haliday (*Ent. Mag.*, III, 1836, p. 445.)

Limothrips cerealeum Haliday. (*Ent. Mag.* III, 1836, p. 445). (Numerous other references also).

Hab. and Loc. In leaves of *Mimusops elengi* with *Arrhenothrips ramakrishnæ*, H.; Coimbatore (No. 51).

This is a well-known insect and has a wide distribution in different parts of the World. It has often been noted as a serious pest of cereals in different parts of Europe; there is a recent record of it from Suez. The male is apterous.

* The numbers added under each species are the author's accession numbers; those without them are not represented in the author's collection, and in such cases the source is indicated by the collector's name, wherever available.

† Bagnall has since (*A. M. N. H.* Dec. 1927) erected a new family *Opadothripidæ* to include Priesner's *Opadothrips* and a new genus *Holarthrothrips*. The genus *Adiheterothrips* may also be brought under this new family, because of the structure and sensoria of the intermediate antennal joints.

HYDATOTHRIPS, Karny. (*Erg. Zentr. Afr. Exp.*, IV, 1912, p. 281.)

Hydatothrips ramaswamiahi, Karny. (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 188, fig. 1.)

Hab. and Loc. From indigo leaves, Coimbatore. (No. 45.); on shoots of sword beans, Coimbatore (*Y. R.* coll.) recently collected by the author from grass in numbers, at coimbatore. A pretty insect brown and yellow in colour with transverse net sculpture along the sides and anterior margin of pronotum; the brown infumation on the thorax and on the abdominal tergites varies in shade from a light brown to an almost blackish brown tinge. The larvæ are yellow with fan-shaped bristles on abdominal segments.

SCIRTOTHRIPS, Shull. [1](*Ent. News*, XX, 1909, p. 222.)

Scirtothrips dorsalis Hood. (*Ins. Ins. Men.* VII, 1919, p. 90.)

Hab. and Loc. In shoots of 'castor' and tender leaves of 'chillies' (*Capsicum* sp.), and brinjal in different parts of S. India. (Nos. 54 and 129). Hood described only the female of the insect, no males being found in the material submitted to him by the author; the general characters of the male, which has been discovered since, are as below:—

Macropterous male. Length ·684 mm. General colour pale yellow, the limbs and abdomen being very pale. Eyes black and large with very little space between the two; tip of mouth cone dark brown. Antennal segments 3 to 8 more or less uniformly dark grey. Abdomen bluntly pointed. The transverse bars not clear as in female.

This species differs from *S. signipennis*, B.,* noted under banana leaf sheaths in Ceylon, both in coloration and in the chætotaxy of the forewings. The abdominal coloration of *S. dorsalis*, H., with the transverse brown bars on the segments, is very characteristic.

When the author first collected this insect at Coimbatore in 1916 it was not known to be injurious. Recently, in 1925-26, it was found doing appreciable damage to the young chillies (*Capsicum*) crop in the Guntur tract. It is very likely that more than one species of *Scirtothrips* exist in S. India.

DENDROTHRIPS, Uzel.[2] (*Monogr. Thys.* 1895, p. 159.)

Dendrothrips indicus, Bagnall. (*A.M.N.H.* (9) IV, 1919, p. 261.)

Hab. and Loc. In tender shoots of arrow-root plant, in company with *Anaphothrips citricinctus*, B., and *Panchætothrips indicus*, B., Taliparamba, Malabar

[1] *loc. cit.*
[2] *loc. cit.*
* Hood considers this an 'Anaphothrips' and the same as the Banana rust thrips of Queensland Euthrips biguttaticorpus Gir.

(No. 57). This is close to the Ceylonese *D. sexmaculatus*, B., differing from it in the color of the abdomen and wings, and in the length of the antennæ.

Dendrothrips bispinosus, Bagnall.[1] (*Bull. Ent. Res.*, XIV, 1925, p. 455).

Hab. and Loc. On tea leaves, Kotagiri, Nilgiris, S. India, 4,000 feet. (No. 83.) This species is distinguished from *D. indicus* by the presence of a bristle near each hind angle of prothorax, thus coming under Priesner's sub-genus *Monochætella*.

RHIPIPHOROTHRIPS, Morgan.[2] (*Proc. U.S.N. Mus.* XLVI, 1914, p. 17.)

Rhipiphorothrips cruentatus, Hood (fig. 3*b*).

Rhipiphorothrips cruentatus, Hood, *Ins. Insc. Men.* VII, 1919, p. 94.
Rhipiphorothrips cruentatus, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 192.

Hab. and Loc. On the tender foliage of grape vine, Coimbatore (No. 19), on grape leaves, Bezwada (No. 157), on leaves of *Eugenia jambolana*, Bangalore (No. 160). Also from Lyallpur, Punjab, (Coll. *Entomologist*, Punjab).

This insect has been found to cause some appreciable injury to tender grape leaves in Coimbatore and other localities in Southern India.

Rhipiphorothrips karna * n. sp.

Resembles *Rhipiphorothrips cruentatus*, H. in many features, the chief distinguishing character being the presence of a transparent leaflike expansion of the pronotum on each side at its postero-lateral region; the general form of the body is more compact, truncate, and stronger built than the former.

Macropterous female, length 1·35 to 1·70 mm. General color uniform coppery or sanguineous brown with yellowish diffusion in some, lighter over occiput and base of abdomen; ocelli with red pigment. Antennæ pale yellow,—joints 2, 3, 6 and 7, with a tinge of grey brown. Mouth cone dark at tip. Prothoracic expansion yellow. Wings and legs as in *R. cruentatus*, H., but the latter diffused with brownish.

Head 1·3 times broader than long; cheeks strongly corrugated; eyes slightly projecting and placed far apart, the space between being about three times the breadth of an eye; vertex in front not clearly notched as in *R. cruentatus* H., nor is the constriction at the base of the head very marked. General form of the antennæ, the sculpture on the body, and the form of mouth cone as in that species.

[1] *loc. cit.*
[2] MORGAN, A. C. New genera and species of Thysanoptera, *Proceedings of the U. S. Nat. Museum*, XLVI, pp. 1-55, 1913.
* Karna=ear expansion.

FIG. 16. *Rhipiphorothrips karna*, n. sp.

Prothorax with a distinct postero-lateral leaflike expansion; shorter than the head and 1·8 times broader than long; pterothorax arched, sides not very much constricted at middle. Sides of whole thorax strongly crenulate. Legs as in *R. cruentatus* H.

Abdomen broader than long, compared to *R. cruentatus*; general shape broadly oval.

Measurements of holotype female: Length 1·35 mm.; Head length ·187 mm.; breadth ·244 mm.; Prothorax length ·168 mm.; breadth ·281 mm.; Pterothorax breadth ·375 mm.; Antenna length ·335 mm. Antennal joints in μ. I 31 II 43 III 56 IV 59 V 47 VI 50 VII 31 VIII 18.

Macropterous Male. Colour as in *R. cruentatus*, H., but with a distinct pronotal expansion as in the female.

Described from a few females and males collected as below: On *Eugenia*, Nellore (No. 84); on *Terminalia catappa*, Malabar (No. 72); on a garden plant, Coonoor, Nilgiris (5,000 ft.) (No. 67*a*); on *Odina wodier*, Palur, S. Arcot (No. 19); on *Eugenia jambolana*, Maddur, Mysore, (No. 21); on grape vine, Coimbatore (No. 56); and on *Eugenia jambolana*, Coimbatore (No. 42). Some of the examples noted above are from the material returned to the author by Karny as *R. cruentatus*, H.; evidently the pronotal expansion was overlooked.

At a casual glance the insect is likely to be mistaken for *R. cruentatus*, H., since the two agree in many respects. Though the presence of the pronotal expansion is an important feature worthy of generic status, the insect is, for the present, treated only as a new species of *Rhipiphorothrips* because of its very close similarity to *R. cruentatus* H.

HELIOTHRIPS, Haliday (*Ent. Magazine* III, 1836, p. 443).

Heliothrips hæmorrhoidalis, Bouché.

Thrips hæmorrhoidalis, Bouché, *Nat. Sch. Gart. Ins.*, 1833, p. 206.
Heliothrips adonidum, Haliday, *Ent. Mag.* III, 1836, p. 443.
Heliothrips hæmorrhoidalis, Burmeister, *Handb. d. Ent.* 1836, p. 412.
(Numerous other references also.)

Hab. and Loc. On tender leaves of garden crotons, Bangalore and Coimbatore (No. 10); on shoots of *Nim* (*Melia*), Coimbatore (No. 11); on a wild plant, Taliparamba, Malabar (No. 16*a*).

This insect is the well known 'hot house thrips' of Europe and America, and has a very wide distribution both in the temperate and tropical regions. It was found to do serious harm to garden crotons when the author first noted it in Bangalore. It is one of the insects, the activities of which may be carefully watched in India.

Heliothrips indicus, Bagnall. (*A.M.N.H.* (8) XII, 1913, p. 291, Fig. 1.)

Hab. and Loc. First described from specimens collected by Lefroy on indigo in Sirsiah, Behar, and on onion and brinjal in Surat. The author has recently secured the species from grasses and seedlings of cereals (No. 68) and in shoots of 'daincha' (*Sesbania aculeata*) in Coimbatore (No. 55); on Colocasia, N. Circars, (No. 171 V.T.R. Coll.); on onion in the Northern Circars (No. 128); and on cabbage and potatoes from Bombay (No. 9); on groundnut in S. Arcot (No. 165). The injury caused to Groundnut by this insect is often serious and the disease

caused is called in some places as 'Thamranovu' in tamil. This is another species which might become a serious pest under favourable conditions. It has been recorded by Corbett [1] as a serious pest of cotton in Egypt in 1918-19, and in that paper he gives an account of the life history, habits, and alternate food plants of the insect with some control measures tried against it. He also gives a list of 17 different wild plants on which the insect has been found to breed, in addition to about 20 cultivated crops.

Heliothrips minutissimus, Bagnall. (*A.M.N.H.* (9) IV, 1919, p. 260.)

Hab. and Loc. In violet flowers, Surat (*Lefroy*) in company with *H. indicus*, B. Smaller in size than the latter and different in the arrangement of the bristles of the 9th abdominal tergite in the male.

Two or three further species of *Heliothrips* have since been found in Coimbatore.

AYYARIA, Karny. (*Ent. Mem. Dept. Agr. Ind.*, IX, 1926, p. 193.)

This genus was erected by Karny from a unique ♀ specimen from the author's collection and the type is with Karny. The main features of it are :—Maxillary palpi 2-jointed, prothorax with long bristles, abdominal tergites with distinct net structure at the sides, and the wings with two rows of unusually long and strong bristles. (See fig. 6*a*).

Ayyaria chætophora, Ky. (*Ent. Mem. Dept. Agr. Ind.*, IX, 1926, p. 193.)

Hab. and Loc. In flowers of 'cowpea' (*Vigna catiang*), Taliparamba, Malabar (No. 22), with numerous specimens of *Tæniothrips longistylus* K.

SCOLOTHRIPS, Hinds.[2] (*Proc. U.S.N. Mus.*, XXVI, 1902; p. 157).

Scolothrips sexmaculatus, Pergande.

Thrips sexmaculatus, Pergande, 1894.

Scolothrips sexmaculatus, Hinds, *Proc. U. S. N. Mus.*, XXVI, 1902, p. 157.

Hab. and Loc. In pomegranate flowers, Coimbatore (No. 47); in *cholam* shoots, feeding on mites, Coimbatore (No. 100).

FRANKLINIELLA Karny. (*Mitt. Natur. Ver. Uni. Wien.*, VIII, 1910, p. 46.)

Frankliniella sulphurea, Schmutz (fig. 2*a*).

Frankliniella sulphurea, Schmutz, *Sitz. d. K. Wiss. Wien.* CXXII, 1913, p. 1019.

Frankliniella sulphurea, Karny, *Ent. Mem. Dept. Agr. Ind.*, IX, 1926, p. 195.

Hab. and Loc. Noted on many plants (*vide* Karny's paper above); recent Indian records are on jasmine flowers, Kollegal, (No. 125), on shoots of chillies

[1] CORBETT, G. H. Observations on cotton thrips in the Gezira Sudan 1918-19. *Bulletin of Entomological Research*. XI, pp. 95-100, 1920.

[2] HINDS, W. F. Contribution to a monograph of the insects of the order Thysanoptera inhabitant N. America, *Proc. U. S. Nat. Mus.*, XXVI, pp. 79-242, pl. I-XI, 1902.

Kadiyam, Godavari (No. 147), in groundnut flowers, Guntur (No. 174), and on cotton, Coimbatore (No. 216). *

TÆNIOTHRIPS, Serville. (*Hist. Nat. des Ins. Hemipteres*, 1843, p. 644.)

This is one of the commonest genera of Thrips found in India, and many species have been noted from different parts ; some among them are likely to become pests under favourable conditions. I have grouped together *Tæniothrips* S., and *Physothrips*, K.*

Tæniothrips (*Physothrips*) *andrewesi*, Bagnall (*A.M.N.H.* (9) VIII, 1921, p. 394.)

Hab. and Loc. On rose, Ringtong, Darjiling (Coll. ?)

Tæniothrips (*Physothrips*) *brunneicornis*, Bagnall (*A.M.N.H.* (8), XVII, 1916, p. 218 & *A.M.N.H.* (9) I, 1918, p. 206.)

Hab. and Loc. On rose, Darjiling ; first described from Japan.

Tæniothrips distalis, Karny.

Tæniothrips distalis, Karny, *Arch. Naturg.* 79A, 1913, p. 122.

Tæniothrips distalis, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 196.

Hab. and Loc. On *Lab-lab* flowers, Anakapalli (No. 111) ; on sann-hemp flowers, Samalkota (No. 112) ; on *Lab-lab*, Coimbatore (No. 109) ; in *Pongamia glabra* flowers, Bangalore (No. 122). It is a common and widely distributed form and causes some injury to leguminous plants.

Tæniothrips (*Physothrips*)* *flavidulus*, Bagnall (*A.M.N.H.* (9) XII, 1923, p. 628.)

Hab. and Loc. In flowers of *Eriobotrya japonica*, Dehra Dun, and on *Clematis* at Bhowali, Kumaon (*Imms* Coll.)

Tæniothrips (*Physothrips*)* *immsi*, Bagnall (*A.M.N.H.* (9) XVIII, 1926, p. 106).

Hab. and Loc. On *Clematis*, Bhowali, Kumaon (*Imms* Coll.).

Tæniothrips jonnaphila, n. sp.

Macropterous female. Length 1·40 to 1·75 mm. General colour pale brown and yellowish ; head and abdomen from 5th segment to apex darkish brown ; mouth cone, thorax and basal segments of abdomen pale greyish yellow ; basal portion of abdomen almost yellow ; eyes dark ; ocelli with brownish red pigment. Antenna : joints 1 and 2 concolorous with head, but apex of 2nd and base of 1st paler ; 3rd and 4th pale yellowish ; 5th base yellowish, apex light grey ; 6th to 8th dark grey. Legs uniform pale yellow with the margins very narrowly light grey. Ovi-

* Priesner Considers *Physothrips*, Ky same as *Tæniothrips*, S.

positor brownish. Wings with uniform pale grey infumation, lighter at base and along median line of forewing, and deeper along median line of hindwing.

Head longer than broad, and as long as prothorax; vertex slightly produced forwards between antennæ, cheeks parallel; occiput broadest at base, with very faint transverse striæ. Eyes oval, one-third as long as head; ocelli almost in an equilateral triangle, basal ones near the middle of eye; one very long bristle in front of each basal ocellus, as long as the postero-lateral bristles of prothorax. A few small setæ along eye margin and 3 or 4 long bristles in a curve behind each eye, the marginal one conspicuous. Mouth cone long and roundly pointed, reaching middle of prosternum. Antenna a little less than twice the length of head; 1st joint stout and as broad as long; on each side of its apex is a small transparent projection which is probably a sense cone, inner one clearer; 2nd joint slightly constricted at base, and broadening towards apex, 3rd very distinctly constricted above base, and broader towards apex with the sides rounded, and is the broadest of all except 1st; 4th broadest just above base, sides parallel towards apex; 5th and 6th of almost uniform breadth throughout, 6th cylindrical with sides slightly arched; 8th longer than 7th; the distal joints with long bristles, especially the 6th, which has two pairs very long; those of 3rd and 4th longer than the sense cones.

Prothorax as long as head with the sides strongly arched and broadly oval. Postero-lateral bristles about one-third the length of prothorax, inner one slightly longer than outer; one transverse row of about 12 bristles at base, and another at the anterior margin, but those of the latter smaller in size; 2 or 3 very small ones at anterior lateral angle, a few along the lateral margins, and a few on the dorsal surface. Pterothorax 1·5 times longer than prothorax, arched at base, and very slightly constricted towards middle. Legs well supplied with bristles; fore tibia at apex with two or three strong spurs. Wings reach 6th abdominal segment; Fore wing: setæ along costa 25 to 28, upper vein 3 or 4 at extreme base, 5 or 6 before centre. (Nine or ten basally and two toward apex); lower vein 13.

Abdomen elongate oval, broadest at 5th segment, where it is as broad as pterothorax, the lateral corners of the hind margins of abdominal segments slightly fringed; ovipositor long and conspicuous. Lateral spines of terminal segments well developed.

Measurements of holotype female. Length 1·75 mm.

Head length ·187 mm., breadth ·168 mm., Prothorax length ·187 mm.; breadth ·225 mm.; Pterothorax breadth ·319 mm.; Antenna length ·351 mm. Antennal joints in μ. I 34 II 40 III 53 IV 62 V 47 VI 75 VII 18 VIII 22. *Male* not known.

Described from about a dozen females collected by the author from tassels of maize in Guntur (No. 115), and from tender leaf shoots of *jonna* (*Sorghum*) in Coim.

batore (No. 137), and Samalkota (No. 181). Recently noted on sugar cane leaves, Coimbatore (*V. M.* Coll.) No. 181(*a*).

Larva pale greenish yellow, eyes and distal joints of antenna dark, limbs paler. A hyaline bristle in front of each eye projecting across the margin. Lateral bristles of posterior abdominal segments long and curved at apex.

The general appearance of this insect, with its long head, resembles that of *Bregmatothrips*, H., but unlike that genus the 3rd and 4th antennal joints bear forked sense cones as is the case in all species of *Tæniothrips*.

Tæniothrips (*Physothrips*) *lefroyi*, Bagnall. (*A. M. N. H.* (8) XII, 1913, p. 292, and *Bull. Ent. Res.* IX, 1918, p. 63.)

Hab. and Loc. In tea flowers, Darjiling (*Lefroy* Coll.); on rose, Dehra Dun (*Gardner* Coll.)

Tæniothrips (*Physothrips*) *longiceps*, Bagnall. (*A.M.N.H.* (8) XVII, 1916, p. 220.)

Hab. and Loc. In *Rhododendron* flowers, Garhwal (*Imms* Coll.)

Tæniothrips longistylus, Karny. (Fig. 17).

Tæniothrips longistylus, Karny, *Jour. Siam. Soc.* XVI, 1923, p. 99.
Tæniothrips longistylus, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 196.

Hab. and Loc. Noted on numerous plants by author (*see* the 1916 reference noted above); a more recent record is on groundnut flowers in Bangalore causing some injury to the crop. This insect is very similar to *T. distalis*, K. in many features, and is also found to be more or less injurious to some cultivated crops, especially leguminous plants. It is distinguished from *T. distalis*, K. by the paler color of the antenna and the shorter and stouter build of the middle antennal joints. This insect was first recorded by Karny from Siam and recently it has been found in Fiji on *Crotalaria striata* [1].

Tæniothrips Major Bagnall. (*A.M.N.H.* (8) XVII, 1916, p. 216.)

Hab. and Loc. In *Rhododendron* flowers, Garhwal (*Imms* Coll).

Tæniothrips (*Physothrips*) *minor*, Bagnall. (*A.M.N.H.* (9) VIII, 1921, p. 393.)

Hab. and Loc. In shoots of *Ipomœa staphylina*, a common Indian climber at Maddur and Coimbatore (No. 61).

Tæniothrips (*Physothrips*) *peculiaris*, Bagnall. (*A.M.N.H.* (9) I, 1918, p. 206.)

Hab. and Loc. On Lucerne, Pusa, Bihar (*Lefroy* Coll.)

[1] On some Tropical Thysanoptera, Karny (*Bull. Ent. Res.* XVI, 1925, p. 126.)

FIG. 17. *Taeniothrips longistylus*, K.—antenna. (From Karny.)

*Tæniothrips pingala,** n. sp.

Macropterous male length 1·25 to 1·40 mm. Colour: Head and 9th abdominal segment grey to dark brown, rest of the body tawny or brownish yellow, extreme apex and ventral region of abdomen pale, legs pale yellow, suffused with light grey in some; surface of thorax also slightly suffused with grey; eyes black; ocelli with red pigment. Antenna: joints 1 and 2 colour of head; 3rd and 4th pale whitish with a slight touch of light grey towards apex; 5th joint base pale, distal portion grey; joints 6 to 8 deeper grey; 7th and 8th lighter than 6th. Wings: extreme base, middle third, and apical eighth fuscous.

Head longer than prothorax and wider than long; vertex arched at sides, slightly produced anteriorly between antennæ; cheeks behind eyes almost parallel finely serrated, with one small sharp spine behind eye conspicuous; eyes oval, slightly projecting, a little less than half the length of head; basal ocelli placed nearer posterior end of eyes; one long conspicuous bristle in front of each posterior ocellus, as long as the postero-lateral bristles of prothorax; a few smaller bristles behind each eye. Occiput distinctly transversely reticulate towards basal region. Mouth cone moderately pointed, extending a little beyond middle of prosternum. Antennæ: 1st joint cup shaped, 2nd broadly oval, 3rd and 4th elongate, distinctly constricted at base and broadest at middle, 5th broadest at apex, 6th almost as long as 4th, broader near base and narrower towards apex; 3rd and 4th with conspicuous forked sense cones.

Prothorax broadly oval, sides strongly arched, one or two small sharp spines at each anterior angle directed forwards, about half the length of the postero-lateral bristles; the latter, half as long as prothorax and both equal; two long bristles at middle of base of pronotum. Legs long, front pair slightly stouter. Pterothorax strongly convex at base, sides slightly constricted at middle. Wings reach almost to the apex of abdomen; arrangement of spines of forewing: costa 24-25, upper vein 12-14 up to the centre, and then 2 at extreme apex; lower vein 14 or 15; the distal two in the upper vein are inside the apical infuscation, and 6 to 8 distal ones of the basal 12, in the central infuscation.

Abdomen long and narrow with the bristles of terminal segments well developed; on the 9th tergite there are two dark long more or less curved bristles on each side and near each posterior one is a short bristle; the last segment with a light colored curved bristle on each side; penis prominent. There are three or our small setæ near the larger spines on the 9th abdominal segment.

Measurements of holotype male—length 1·30 mm. Head length ·156 mm. breadth ·187 mm. Prothorax length ·125 mm. breadth ·215 mm. Pterothorax breadth ·319 mm. Antenna length ·350 mm. Antennal joints in *u.* I 28 II 37 III 75 IV 68 V 50 VI 62 VII 15 VIII 15.

Macropterous female. Length 1·35 mm. General colour uniform reddish brown, feelers almost uniformly greyish brown, darker than in the male; eyes oval, ocelli

* =tawny or brownish yellow.

with red pigment. Abdomen broadly oval and of a lighter colour than head and thorax. 9th abdominal segment with a transverse row of 6 long spines and the tail segment with a transverse row of 4 spines—all stout and sharp. 8th joint of antenna slightly longer than the 7th ; antennal joints well supplied with bristles and sense cones. Ocellar bristles as in the male. There is a transverse row of 7 or 8 small bristles at base of pronotum, of these the two central ones are bigger, but these are smaller than the postero laterals. Wing infuscation very little, chætotaxy—costa 25 to 26, Upper vein 14 or 15—2 Lower vein 15 or 16.

Described from a number of males and one female collected by the author from flowers of *Pongamia glabra* in Bangalore (No. 119).

In some respects this species appears similar to *Physothrips peculiaris*, B., from Bihar, but differs chiefly in colour and wing chætotaxy.

Tæniothrips (*Physothrips*) *setiventris*, Bagnall (*Bull. Ent. Res.* IX, 1918, p. 61).

Hab. and Loc. On tea, Darjiling (*Andrews* Coll.) in Sun flowers, Pusa (*Misra* Coll.). This insect has been noted to be injurious to tea in Assam for some years ; found in company with another species, *Haplothrips tenuipennis*, B.

Tæniothrips (*Physothrips*) *usitatus*, Bagnall (*A.M.N.H.* (8) XII, 1913, p. 293).

Hab. and Loc. In flowers of *Butea frondosa*, Allahabad (*Imms* Coll.).

ISONEUROTHRIPS, Bagnall. (*A.M.N.H.* (8) XV, 1915, p. 592.)

Isoneurothrips orientalis, Bagnall. (Plate XXXII, fig. 1.)

Isoneurothrips orientalis, Bagnall, (*A.M.N.H.* (8) XV, 1915, p. 593).
Isoneurothrips orientalis, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 197, fig. 6.

Hab. and Loc. In flowers of *Morinda tinctoria*, Coimbatore (No. 6) ; in flowers of jasmine, Coimbatore and Kollegal (Nos. 27 and 153).

This insect was first noted in Sarawak in 1915.

THRIPS, Linnæus (*Syst. Nat.* (ed X.), p. 457, 1758.)

Thrips albipes, Bagnall (A.M.N.H. (8) XIII, p. 25, 1914 and *A.M.N.H.* (9) XVIII, 1926, p. 110).

Hab. and Loc. In flowers of *Eriobotya japonica* and on *Clematis*, Bhowali, Kumaon (*Imms* Coll.). First record from Japan.

Thrips florum, Schmutz. (Pl. XXXII, fig. 2, 3.)

Thrips florum, Schmutz, *Sitzumgs d. k. Akad.* CXXII, 1913, p. 13.
Thrips florum, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 198.

Hab. and Loc. Found on numerous plants (*see* Karny's paper). Recent records are, in orange flowers, Nilgiris (No. 71*a*) ; in *Thevetia* flowers, Coimbatore (No. 85) ;

in banana flower sheaths Samalkota (No. 113); on rose, Kadiam (No. 146); in flowers of '*Dividivi*,' Coimbatore (No. 138); and in flowers of *Corropita guineaensis*, Bangalore (No. 121). This is also a common species of 'thrips' in S. India. The insect was first noted in Ceylon in 1913.

Thrips immsi, Bagnall (*A.M.N.H.* (9) XVIII, 1926, p. 110).

Hab. and Loc. In flowers of *Eriobotrya* and *Clematis*, Bhowali, Kumaon and Dehra Dun. (*Imms* Coll).

Thrips melanurus, Bagnall (*A.M.N.H.* (9) XVIII, 1926, p. 111).

Hab. and Loc. On rose, Ringtong, Darjiling. (*Andrews* Coll.).

Thrips nilgiriensis, n. sp.

Macropterous female. Length ·95 to 1·25 mm. Colour, orange to bright yellow, some specimens uniformly deep orange; eyes black, ocelli with bright red pigment; vertex and mouth cone sometimes of deeper colour. Antenna: 1st joint pale whitish; 2nd brownish yellow; 3rd pale grey, paler at base; 4th to 7th grey with bases of 4th and 5th pale, 7″ paler than 6″. Legs pale, yellowish white. Wings with pale yellowish infumation; bristles greyish brown.

Head more than 1·5 times broader than long, slightly shorter than prothorax; vertex slightly produced in front between antennæ; cheeks constricted immediately behind eyes and then bulging out conspicuously and rounding near base; a transverse row of four strong bristles towards anterior margin of vertex, of which the central two long and conspicuous. Occiput with a transverse row of bristles just behind the eyes, the two behind each posterior ocellus conspicuous; eyes almost spherical and very slightly bulging out, less than half the length of head; ocelli placed near basal margin of eyes in a very broad obtuse angled triangle, anterior one smaller; one bristle just above each basal ocellus. Occiput with transverse striæ near base and with a few conspicuous bristles; margins of eyes and cheeks with small bristles; a few conspicuous bristles also on ventral aspect of vertex. Mouth cone moderately pointed, reaching base of prosternum. Antenna more than twice the length of head 1st joint short and cup-shaped; 2nd broadly oval with strong bristles; 6th long, sides parallel to middle thence converging towards apex; 3rd, 4th and 6th sub-equal, 1-3 broadest; 7″ elongate conical.

Prothorax scarcely longer than head; sides strongly convex, one sharp spine at each anterior lateral angle pointed forwards; the posterior lateral pair equal and two-thirds as long as prothorax; sides, basal region, and surface of pronotum fringed with numerous small bristles. Pterothorax strongly convex at base, constricted at middle, and thence almost parallel sided. Legs with numerous bristles. Wings extend a little beyond apex of abdomen; forewing along costa with 25 or 26 setæ, lower vein 12 or 13, and upper vein 6 at base, 1 towards centre and, 2

at distal third rather far apart from each other; the setæ sharp towards apex of wing.

Abdomen elongate oval, broadest at middle; sides and dorsum with numerous bristles, posterior spines long and brownish, the lateral one of 9th segment 1·5 times longer than prothoracic spine. Ovipositor conspicuous.

Measurements of holotype female length ·937 mm. Head length ·087 mm. breadth ·140 mm. Prothorax—length ·094 mm. breadth ·162 mm. Pterothorax breadth ·203 mm. Antenna length ·255 mm. Antennal joints in *u.* I 28 II 34 III 47 IV 50 V 37 VI 47 VII 12.

Macropterous male. ·800 mm. similar to female; body slender and shorter. Color somewhat paler yellow; antennal joints 3 to 7 lighter grey, with the bases of 3 to 6 paler. Median spines of last abdominal segment distinctly curved.

Described from 7 females and 3 males collected by the author in orange flowers at Runnymede, Nilgiris, 4,000 feet (No. 71).

Larvæ lemon yellow with reddish eyes and pale limbs, vertex drawn forwards conspicuously; eyes projecting.

The bristly body, the orange coloration, and the striking armature of the vertex are the chief features in this insect; there are also variations in size and color. It is different from all known species, although close to the European *T. flavus*, S.

Thrips oryzæ, Williams (*Bull. Ent. Research*, Vol. VI 1915, p. 353). (Fig. 18.)

Hab. and Loc. On young rice plants in different rice areas of S. India as an injurious species; important records are from Tanjore (No. 94) and Coimbatore (No. 52). Recorded on Rice in Assam (*vide* recent Deptl. report). The writer has noted the insect also in Kollegal, Malabar and Chingleput. This insect was first collected by the author and described by Williams in 1915. The female alone was described then; the author has recently collected the male also.

Macropterous male. Wings extending beyond body and with greyish infumation, body light to dark brown, posterior margins of abdominal segments of deeper hue. Eyes large, antennal joints 2 to 4 pale, rest grey; length ·790 mm. (Tanjore No. 94). Karny[1] records the occurrence of this insect on rice in Java also.

Thrips pallidulus, Bagnall (*A.M.N.H.* (9) XIII, 1924, p 424).

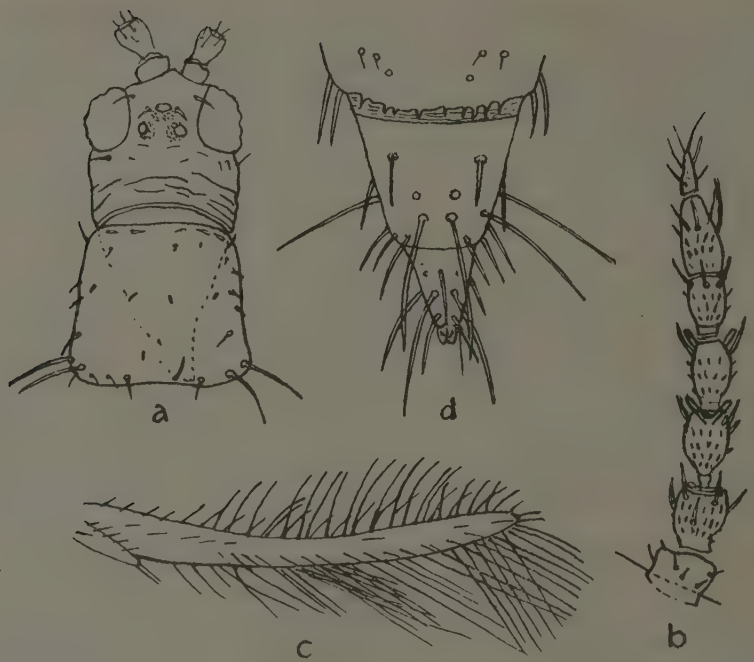
Hab. and Loc. No habitat given; from Pusa, Bihar (*Lefroy* coll.)

Thrips palmi, Karny.

Thrips palmi, Karny, *Bull. Deli. Proefst. Sumatra* No. 23, 1925, p. 10.
Thrips palmi, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 199.

Hab. and Loc. In lablab flowers, Coimbatore (No. 41); on *lantana* flowers Coonoor, Nilgiris (No. 93).

[1] *loc. cit.*



(*a*) Head and prothorax. (*b*) Antenna. (*c*) Fore wing. (*d*) Apex of abdomen (dorsal).
FIG. 18. *Thrips oryzæ*, W. (from Williams).

Thrips pandu,* n. sp.

Macropterous female length ·950 to 1·035 mm. General colour pale whitish yellow with the margins narrowly bordered with light or dark grey. Eyes black. Ocelli with red pigment. Antenna pale whitish with grey patch towards apex of almost every joint; 1st joint pale transparent; 2nd and 3rd slightly suffused with grey; 4th and 5th apical half grey; 6th apical two-thirds grey; 7th wholly grey. Mouth cone rather grey. Wings with very light yellowish infumation.

Head broader than long, but shorter than prothorax; vertex front margin almost transverse, cheeks slightly constricted behind eyes and immediately widening, with sides distinctly arched towards base; eyes as long as broad and almost spherical; bristles near eye and ocellus very small and inconspicuous; one small spine on cheek just behind eye. Mouth cone moderately pointed and extending a little beyond middle of prosternum. Antenna almost 3 times as long

* = pale yellow.

as head, 6th joint longest, 3-5 sub-equal, 1st stout and cupshaped; 2nd globular oval, as broad as long; 3rd to 5th almost of same shape, broader towards apex; 6th broad at base, broadly connected to 7th; 2nd with a few strong bristles. Prothorax 1·50 times as long as head and slightly broader than long, dorsum fringed with small setæ, sides convex; the postero-lateral pair of bristles rather small, only one-fifth of the length of prothorax; a transverse row of setæ at base of pronotum. Pterothorax with sides arched and slightly constricted at middle, broader than long. Wings extend to 7th abdominal segment; forewing: costa with 30-32 setæ, upper vein at base 4+3, 1 or 2 at centre and 2 towards apex; usually three from centre towards apex, but 4 found in some; lower vein 15 or 16.

Abdomen elongate oval, rather abruptly narrowing near 7th segment; bristles of abdomen except terminal ones, comparatively small and inconspicuous.

Measurements of holotype female length 1·035 mm. Head length ·081 mm. breadth ·125 mm. Prothorax—length ·125 mm. breadth ·143 mm. Pterothorax—breadth ·218 mm. Antenna length ·201 mm. Antennal joints in *u.* I 22 II 25 III 37 IV 34 V 34 VI 40 VII 9.

Macropterous male: length ·725 to ·740 mm. Color paler than female, the grey bordering of the margins rather clearer, ocelli bright red; wings almost clear. Antennal joints somewhat pale grey; eyes round and black; similar in other respects to female.

Described from six females and two males collected by the author from flowers of 'citrus' plants, Coimbatore (No. 99). Close to *T. microchætus*, Ky., and very close to Karny's *Ramaswamiahiella subnudula* differing however in the size of the pronotal bristles, the coloration of the antenna, in the chætotaxy of the forewing and in general build of the body; this insect is stouter built. Further studies would enable us to definitely assign its proper relationship.

Thrips parvus, Schmutz.

Thrips parvus, Schmutz, *Sitz. d. K. Akad. Wiss.* CXXII, 1913, p. 1004.
Thrips parvus, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 199.

Hab. and Loc. In flowers of *Cæsalpinia pulcherrima*, Coimbatore (No. 37).

Thrips tabaci, Lind.

Thrips tabaci, Lindeman, *Die Schadl. Ins. d. Tabac. Bess. Bull. Soc. Imp. Nat. Moscou.* I, 1888, pp. 10-77.
Thrips tabaci, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 199.
Numerous other references also.

Hab. and Loc. In flowers of cotton, Coimbatore (No. 15); on cabbage leaves, Bombay (No. 9); on a wild bush, Bangalore (No. 131); on Onion—Coimbatore and Bellary (No. 215.) Nos. 15 and 9 are perhaps varieties of *tabaci*. Priesner appears to hold the opinion that these oriental forms, though very close to *tabaci*, are not the typical *T. tabaci* Lind.

STYLOTHRIPS, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 205).
(=MICROCEPHALOTHRIPS, B.=CTENOTHRIPELLA, PR.)

Stylothrips brevipalpis, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 206).

Hab. and Loc. In chrysanthemum flowers, Coimbatore (No. 20); one specimen on chrysanthemum flowers, Coonoor, Nilgiris (No. 93*a*), appears to be a color variety of *brevipalpis* and shows the marginal fringes of the abdominal segments very conspicuously; the postero-lateral spines of the prothorax also appear to be slightly longer.

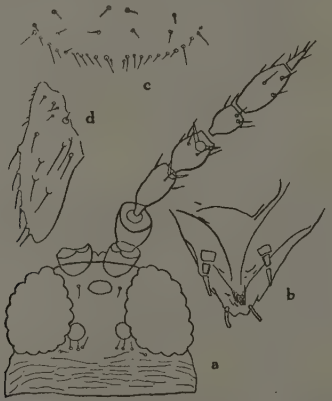


FIG. 19. *Stylothrips brevipalpis*, Karny. *a* dorsal view of head; *b* mouth cone; *c* hind part of prothorax chaetotaxy; *d* fore wing of a brachypterous ♂. (From Karny.)

This insect appears to be very closely related to, if not the same as the American *Thrips abdominalis*, Crawford (27) or (*T. femoralis*, Jones), for which Bagnall recently erected the new genus *Microcephalothrips* (5*g*). The writer had the opportunity recently of examining specimens of *T. abdominalis* in the collection of Mr. Dudley Moulton, of San Francisco, and comparing the same with the Indian *Stylothrips*; the resemblance is found to be so close as to make one doubt whether the two are not of the same genus. If, as the writer is inclined to believe, these two are congeneric, Karny's *Stylothrips* may have to sink, giving place to *Microcephalothrips*, B.

RAMASWAMIAHIELLA Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 208).

This genus is very close to *Anaphothrips* in general structure but differs in having seven jointed antennæ. Priesner considers 'Ramaswamiahiella' of Karny to be only a 'Thrips'.

Ramaswamiahiella subnudula, Ky. (*Ent. Mem. Dept. Agr. Ind.* IX, 19 6, p. 209), fig. 11).

Hab. and Loc. In *Calotropis* flowers (No. 39). In pomegranate (No. 47); *Cæsalpinia* (No. 37); and mango flowers (No. 38)—all from Coimbatore.

BREGMATOTHRIPS, Hood (*Proc. Biol. Soc. Wash.* XXV, 1912, p. 66).

Bregmatothrips binervis, Kobus.

Oxythrips binervis, Kobus, *Sugarcane parasites in Java* by Deventer; 1906, p. 278.

Bregmatothrips ramakrishnæ, Bagnall, *A.M.N.H.* (9) XII, 1923, p. 625.

Bregmatothrips binervis, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 205.

Hab. and Loc. In leaf tips of sugarcane, Palur S. Arcot (No. 23); the tips of tender leaves are rolled up and the leaf surface presents a more or less shrivelled up appearance. The insect was first noted on sugarcane in Java.

MYCTEROTHRIPS, Trybom. (*Ent. Tidsk.* 1912).

Mycterothrips setiprivus, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 200).

Hab. and Loc. In shoots of *Acacia suma* (Nos. 32 and 126), Coimbatore. (Pl. XXXII, fig. 4.)

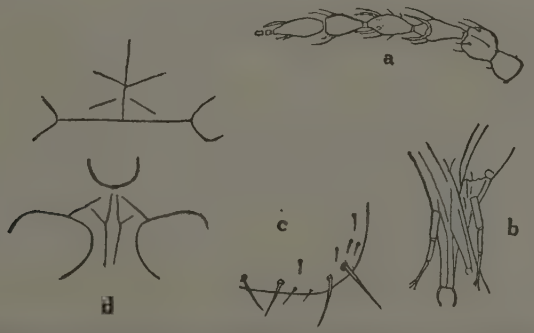


FIG. 20. *Mycterothrips setiprivus*, Karny ♀, *a* antenna; *b* mouth cone; *c* hind part of prothorax, chaetotaxy; *d* structures of meso and metasternum. (From Karny.)

APTINOTHRIPS, Haliday (*Entom. Mag.* III, 1836, p. 446).

Aptinothrips ruficornis, var. *connaticornis*, Bagnall. (*A.M.N.H.* (9) I, 1918, p. 205).

Hab. and Loc. In tea flowers, Darjiling (*Lefroy* Coll). This is same as *A. rufus* Gm, according to Priesner.

ANAPHOTHRIPS, Uzel (*Monogr. Thys.* 1895, p. 142).

Anaphothrips oligochætus, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 201). (Pl. XXXII, fig. 5.)

Hab. and Loc. In flowers of cotton, Coimbatore (No. 15), in pomegranate (No. 47), and of *Cæsalpinia* flowers, Coimbatore (No. 37).

Anaphothrips ramakrishnai, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 203).

Hab. and Loc. In ears of *cumbu* (*Pennisetum typhoideum*), Coimbatore. (Pl. XXXII, fig. 6.)

FIG. 21. *Anaphothrips ramakrishnai*, Karny, ♀ antenna. (From Karny).

Anaphothrips fungivora, n. sp.

Macropterous female: length 1·25 mm. Colour pale whitish yellow with a touch of light grey in parts; mouth cone, vertex between eyes, and cheeks near base show the grey markings a little clearly. Eyes black, ocelli with reddish pigment in some; abdominal segments 8 to 10 greyish brown, ovipositor brown. All legs narrowly margined with light grey. Wings with light grey infumation, basal third clear, the infumation conspicuous along the two nerve tracts of forewing, hind wings almost clear. Antenna: 1st joint has the color of vertex; 2nd brownish yellow deeper than 1st and 3rd; 3rd pale yellowish white; 4th to 8th dark to brownish grey, with the base and apex of 4th, and in some, the extreme base of 5th pale.

Head scarcely longer than prothorax, broader than long, vertex almost truncate in front, and broadly arched near eyes; behind eyes slightly constricted, and then widening out towards base, where the head is broadest; occiput with faint transverse striæ near base. Eyes slightly bulging out, one third as long as the breadth of head, almost spherical; a transverse row of bristles a little behind eyes, of which two or three behind each eye conspicuous, each as long as the breadth of an eye; one small bristle behind each posterior ocellus and one on each side of front ocellus; a few along outer margin of eye and cheeks also. Mouth cone with a broad base and rounded sides, slightly constricted beyond base, and bluntly pointed apically, extending to base of prosternum; maxillary palpi long. Antenna: more than twice the length of head, 1st joint broad and cup shaped; 2nd ovoid; 3rd very narrowly constricted at base forming a stalk and then widening, the constriction collar-like, slightly narrowed at apex also; 4th more or less similar to 3rd; 5th narrow at base with sides rounded and becoming broader towards apex; 6th long and conical; 7th smaller than 8th.

Prothorax with strongly convex sides, 1·5 times as broad as long, dorsum fringed with numerous minute bristles, the base with a row of 14 or 15 small rather curved bristles between the postero-lateral pair; the latter as long as eye. Pterothorax about three times the length of prothorax, lateral sides almost parallel. Wings reach 8th abdominal segment and have the two nerve tracts distinct; chætotaxy: costa 18-20 spines; lower vein 4 beyond centre, none basally; upper vein 5 before middle, and 3 towards apex.

Abdomen 1·5 times as long as head and thorax together, broadly oval, broader than pterothorax; ovipositor long and conspicuous by its brownish color.

Measurements of holotype female length 1·25 mm.

Head 1·109 mm. breadth ·131 mm. Prothorax length ·112 mm. breadth ·168 mm. Pterothorax breadth ·244 mm. Antenna length ·254 mm.

Antennal joints in *u* I 22 II 31 III 59 IV 53 V 31 VI 37 VII 9 VIII 12.

Macropterous male: Length ·920 mm. similar to female, slightly paler and with the grey color, especially of mouth cone, clearer in some; antennal joints 1-3 yellowish, rest greyish brown; extreme base of 4th pale. Wings reach apex of abdomen which is bluntly rounded; bristles of terminal abdominal segments strong. Described from ten females and four males collected by C. J. George, feeding on 'rust' on wheat plants, Coimbatore (No. 104). Belongs to *Chætanaphothrips* group of Priesner.

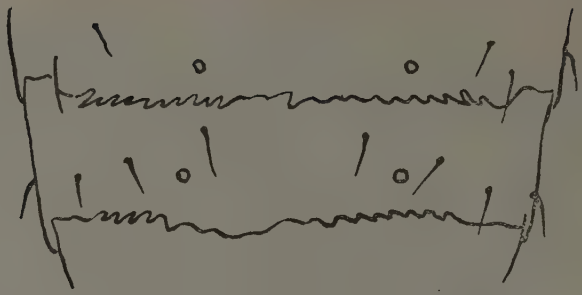
Anaphothrips (*Euthrips*) *citricinctus*, Bagnall (*A.M.N.H.* (9) IV, 1919, p. 270).
=*E. flavicinctus* Karny ?

Hab. and Loc. Originally described by Bagnall, from one female collected by the author on arrow-root leaves in Taliparamba, Malabar in 1918; recently the author has secured further material from *cholam* shoots at Coimbatore (No. 141), but only females found so far. It is quite probable that this insect is the same as Karny's *flavicintus* though I have not seen the type of Bagnall. If it is so Bagnall's name is only a synonym.

PERISSOTHRIPS, Hood (*Ins. Ins. Menst.* VII, 1919, p. 91).

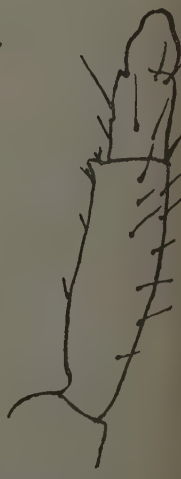
Perissothrips parviceps, Hood (*Ins. Ins. Men.* VII, 1919, p. 92). Fig. 22.

Hab. and Loc. In shoots of *Ailanthus excelsa* (No. 32) and in shoots of *Acacia Suma* (No. 126), both from Coimbatore. There is found some variation in the color of the 5″ and 6″ antennal joints in some specimens.



(*b*) Posterior margins of abd. segts. 6 and 7 of male.

(*a*) Head and prothorax.



(*c*) Right foretibia of male.

FIG. 22. *Periscothrips parviceps*, H. (figs. after Hood.)

DENDROTHRIPOIDES, Bagnall. (*A.M.N.H.* (9) XII, 1923, p. 624).

The striking features of this insect are (1) the long and well armed tenth segment of the abdomen which is more or less as in *Panchætothrips*, B., and (2) the wings which are as in *Aneurothrips*, K. It differs however from *Aneurothrips* in having a three-jointed, instead of a two-jointed, maxillary palpus.

Dendrothripoides ipomoea, Bagnall (*A.M.N.H.* (9) XII, 1923, p. 625).

Hab. and Loc. In shoots of *Ipomoea staphylina*, collected by the author in Maddur, Mysore (No. 62).

TRYPHACTOTHRIPS, Bagnall (*A.M.N.H.* (9) VII, 1921, p. 264).

Tryphactothrips mundus, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 190).

Hab. and Loc. In small galls of a wild plant, Taliparamba, Malabar (No. 16), fig. 10 (*a*).

Tryphactothrips rutherfordi, Bagnall.

Dinurothrips rutherfordi, Bagnall A. M. N. H. (8) XV, 1915, p. 319.
Tryphactothrips rutherfordi, Bagnall A. M. N. H. (9) VII, 1921, p. 264.

Hab. and Loc. In *Dhatura* flowers, S. Arcot (No. 186); in cotton and brinjal leaves, Coimbatore (*V. M.* Coll.). This insect has been found fairly common in S. India.

BRACHYUROTHRIPS, Bagnall (*A.M.N.H.* (9) VII, 1921, p. 265).

Brachyurothrips indicus, Bagnall (*A.M.N.H.* (9) XVIII, 1926, p. 98).

Hab. and Loc. Salt marsh, Calcutta (*Fletcher* Coll.).

Family PANCHÆTOTHRIPIDÆ.

PANCHÆTOTHRIPS, Bagnall (*Rec. Ind. Mus.* VII, 1912, p. 257). Fig. 23.

This genus described in 1912 has been found to be exclusively confined to India so far. The prominent characteristics are the collar like structure at base of head, the unarmed pronotum, the fore wings with long and sharp spines, the long and

tube like structure of the 10th abdominal segment, and the strongly developed anal spines. There is no trace of a lower vein in the fore wings.

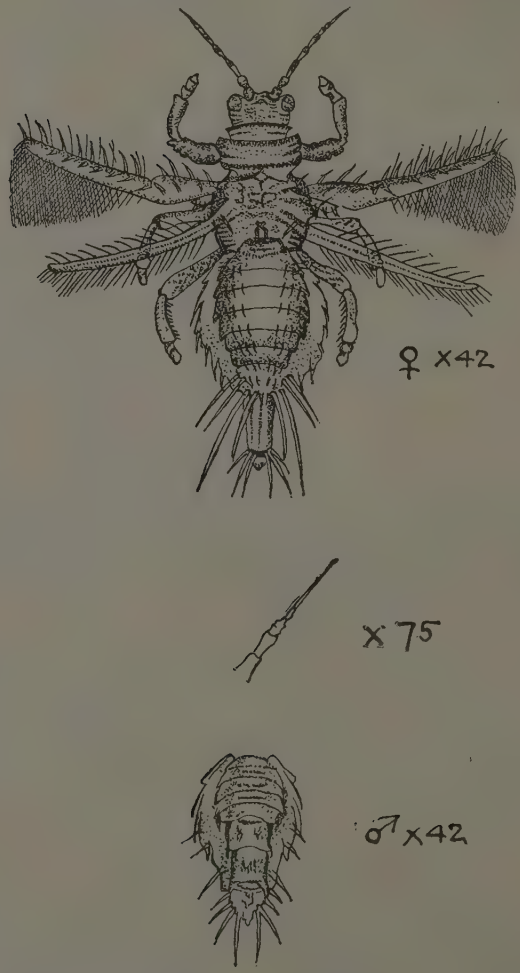


Fig. 23. *Panchætothrips indica*, Bgll., on Arrow-root leaves. Female insect, antenna and abdomen of male (after Bagnall.)

Panchætothrips indicus, Bagnall (*Rec. Ind. Mus.* VII, 1912, p. 257).

Hab. and Loc. In turmeric leaves, near Madras (first record of 1886); recently on turmeric leaves, Coimbatore, and on arrow-root leaves, Malabar and Travancore (No. 53). On Banana and Turmeric Pusa, (*Lefroy* Coll.). Pre-adult nymphs 1·30 mm. long. Lemon yellow in color, limbs and wing pads lighter. Eyes dark with red pigment. The 10th segment of abdomen is in the form of a long tube to the base of which the wing pads extend.

Sub-order TUBULIFERA.

Synoptical key to the Tubulifera noted from India.

I. Tube much shorter than the remaining abdominal segments taken together . . . . . .
A. Third antennal joint with a ring of sense rods at apex . . . ECACANTHOTHRIPS, Bagnall.
AA. Third antennal joint without such sense rods at apex . .
(*a*) Head not projecting beyond eyes, vertex not sharply conical .
(*b*) Cheeks with warts or strong corrugations . . . .
(*c*) Body and tube reticulate . . . . . THILAKOTHRIPS, *n. gen.*
(*cc*) Body and tube not reticulate . . . . . .
(*d*) Wings present . . . . . PHLŒOTHRIPS, Haliday.
(*dd*) Wings reduced . . . . . MALACOTHRIPS, Hinds.
(*bb*) Cheeks without warts or corrugation . . . . .
(*x*) Cheeks without thorn-like bristles throughout their entire length . . . . . .
(*e*) Mouth cone pointed . . . . . .
(*f*) Wings not reduced in middle . . . . .
(*g*) Head barely or not longer than prothorax . .
(*h*) 7th and 8th antennal segments distinct . .
(*i*) Fore femora of female not swollen . . . EURHYNCHOTHRIPS, Bagnall.
(*ii*) Fore femora of female swollen . . . ARRHENOTHRIPS, Hood.
(*hh*) 7th and 8th antennal segments apparently united RHYNCHOTHRIPS, Hood.
(*gg*) Head distinctly longer than prothorax . . . LIOTHRIPS, Uzel.
(*ff*) Wings reduced in the middle . . . . .
(*i*) Head twice as long as broad . . . . DOLICHOTHRIPS, Karny.
(*ii*) Head only about a third longer . . . NEOHEEGERIA, Schmutz.
(*ee*) Mouth cone not pointed . . . . . .
(*j*) Wings vestigial, or narrowed in the middle, distinctly or slightly . . . . . .
(*k*) Wings vestigial and mouth cone reaching mesosternum . . . . . GNOPHOTHRIPS, Hood & Williams.
(*kk*) Wings not reduced usually but narrowed in the middle, and mouth cone shorter . . .
(*l*) Fore femora in both sexes stout . . . MESOTHRIPS, Zimmerman.
(*ll*) Fore femora not stout in both sexes . . .
(*m*) Bristles on tube and 9th segment very short . HINDSIANA, Karny.
(*mm*) Bristles on tube and 9th segment normal .
(*n*) Head pronouncedly longer than prothorax . ZYGOTHRIPS, Uzel.
(*nn*) Head usually little or not longer than prothorax . . . . . HAPLOTHRIPS, Serville,

(*jj*) Wings not narrowed at middle . . . .
(*o*) Head little or not at all longer than prothorax .
(*p*) Head pronouncedly broader than long . .
(*q*) 7th and 8th ant. segments together but little longer than 3rd . . . . . BRACHYTHRIPS, Reuter.
(*qq*) 7th and 8th joints separate, each about as long as 3rd joint . . . . . AUSTROTHRIPS, Brethes.
(*pp*) Head as long as broad or longer . . .
(*q*) Head broadest posteriorly with sides converging anteriorly . . . . . CECIDOTHRIPS, Kieffer.
(*qq*) Head not broadest posteriorly . . .
(*r*) Labrum pointed and extending beyond the mouth cone . . . . . TRICHOTHRIPS, Uzel.
(*rr*) Labrum blunt and not exceeding the mouth cone . . . . . EOTHRIPS, Hood.
(*oo*) Head distinctly longer than prothorax . . .
(*s*) Fore femora toothed . . . . . ANDROTHRIPS, Karny.
(*ss*) Fore femora not toothed . . . . .
(*t*) Cheeks with a stout spine . . . . RAMAKRISHNAIELLA, Karny.
(*tt*) Cheeks without a strong spine . . .
(*u*) Fore femur slender . . . . . GYNAIKOTHRIPS, Zimmerman.
(*uu*) Fore femur in both sexes stout . . .
(*v*) Fore tarsal tooth very stout and fore tibia with a tubercle at apex . . . MALLOTHRIPS, *n. gen.*
(*vv*) Fore tibia without tubercle and tarsal tooth of moderate size . . . . EUGYNOTHRIPS, Priesner.
(*xx*) Cheeks with thorn like spines throughout their length . DINOTHRIPS, Bagnall.
(*aa*) Head produced more or less in front of eyes, vertex conical .
(1) Abdominal segments 2-8 without lateral tooth . .
(2) Head extending very little beyond eyes . . .
(3) Cheeks without thorns . . . . . GIGANTOTHRIPS, Zimmerman.
(33) Cheeks with thorns and fore femora with a sickle shaped bristle at apex . . . . . DICAIOTHRIPS, Buffa.
(22) Head extending far beyond the eyes . . . .
(4) Fore tibia at end with a sharp angular tooth . . . PHOXOTHRIPS, Karny.
(44) Fore tibia only with blunt angles . . . . . KLEOTHRIPS, Schmutz.
(11) Abdominal segments 2 to 8 with a lateral tooth . . IDOLOTHRIPS, Haliday.
II. Tube very long, about as long as all the other abdominal segments taken together . . . . . LEEUWENIA, Karny.

Family ECACANTHOTHRIPIDAE.

ECACANTHOTHRIPS, Bagnall. (5i) *Ann. Soc. Ent. Belg.* LII, 1908, p. 348).

Ecacanthropthrips sanguineus, Bagnall.

Acanthothrips sanguineus, Bagnall, *A.M.N.H.* (8) I, 1908, p. 361.

Ormothrips sanguineus, Buffa, *Redia* V., 1908, p. 166.

Ecacanthothrips sanguineus, Bagnall, *Ann. Soc. Ent. Belg.* LII, 1908, p. 348.

Hab. and Loc. Found usually under bark. Recent records from Dehra Dun and Central India; known from Burmah and Bengal, and also noted in Ceylon and Malaya archipelago.

A very interesting form with striking structural peculiarities; reddish in colour and having curious sense-cones on the antennæ (*see* fig. 8*a*).

Family PHLOEOTHRIPIDAE.

PHLŒOTHRIPS, Haliday (*Ent. Mag.* III, 1836, p. 441).

Phlœothrips anacardii, Newman (*T.E.S.*, 1856, p. 266).

Hab. and Loc. On *Anacardium* sp. Mysore. This is one of the earliest recorded species from India. Unfortunately, the description is so vague that the true generic position of the insect is not clear from it; from the meagre description of the insect it appears to be more near the genus *Gynaikothrips*, Z., than *Phlœothrips*, s. str.

THILAKOTHRIPS,* new genus.

Body with the surface almost wholly reticulate; the head, pterothorax and the femora show irregular reticulate structure; the tube surface has regular polygonal areas. Head dome shaped, converging towards the eyes and widening towards base, where there is a slight lateral expansion like a lappet on each side; cheeks frilled and corrugated. Legs stout with margins of femora and tibia serrated and fringed with bristles, which are fimbriate or polyp shaped at apex. Mouth cone moderately pointed and reaching the middle of prosternum. Wings not narrowed in the middle and without duplicate hairs. Type *T. babuli*, new sp.

The corrugated cheeks, the form of the mouth cone, and the structure of the wings show affinities to the *Phlœothripinæ;* but the peculiar shape of the head, the reticulate body surface, and the structure of the bristles are very striking and unique features.

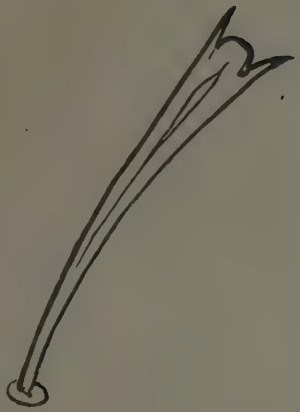
Thilakothrips babuli, n. sp. Fig. 24.

Macropterous female. Length from 2 to 2·5 mm. General colour, bright to orange yellow with dark or reddish grey markings. Head light yellow with the cheeks and apical region of the mouth cone greyish. Eyes black, ocelli and sometimes eyes often with red pigment. Antennæ: joints 1 and 2 dark grey with the margins darker; 2nd darker than 1st; 3rd pale yellowish white,—it is the only joint which has no mixture of grey or brown; 4th and 5th pale yellow basally, tinged with dark grey distally; 5th more so than 4th; 6th, 7th, and 8th dark brown; 7th and 8th of a deeper hue than 6th. Fore wings with a very light grey infumation, conspicuous towards middle and along the margins. Hind wings almost clear. Thorax concolorous with head; the lateral margins slightly tinged with dark grey. Femur and tibia of foreleg greyish yellow with the outer margins of femur broadly, and almost the whole of the basal third of the tibia dark grey, apex of tibia and the tarsus yellow. Mid and hind legs: almost the whole of the femur except the extreme base, and two-thirds of the tibia grey, rest pale yellow. Abdomen: pale to bright yellow with a faint greyish tinge all over; the mid-dorsal region of each of the dorsal tergites 3-8 with a distinct dark brown to black patch; the 9th segment and the tube also darkish dorsally. The grey and dark brown color on the yellow ground is lighter in some, and deeper in others; especially is this the case on the mid and hind legs, and the abdomen.

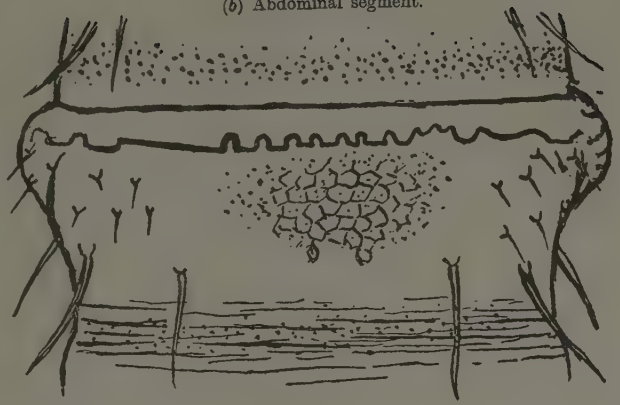
* Thilaka — adornment.

FIG. 24 (*a*). *Thilakothrips babuli*. n. gen. and sp. Head and Prothorax,

(*d*) a typical bristle.



(*b*) Abdominal segment.



(*c*) End of abdomen.

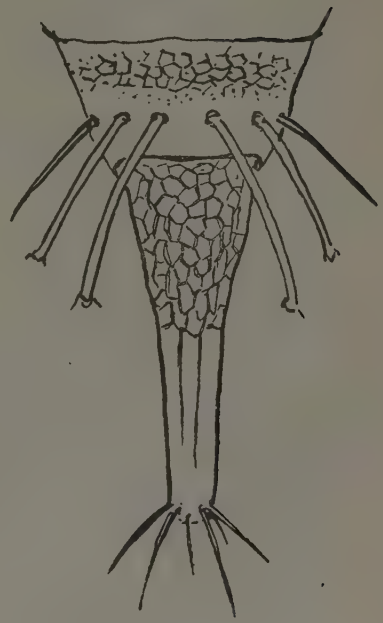


FIG. 24, *b*, *c*, *d*, *Thilakothrips babuli*, n. gen. and sp.

Head: Longer than broad, the cheeks clearly converging towards the eyes, broadest at base, more or less dome or hemlet shaped, the lateral angles of the base on each side slightly drawn outwards as a sort of flap or lapel. Surface deeply reticulate and corrugated, showing polygonal areas in parts and fringed with curved tubular bristles. The cheeks have distinct crenulations which appear more or less like warts, but have no spines or tubercles. Vertex in front entire, almost entirely occupied by the antennal bases. Ocelli arranged more or less in an equilateral triangle, and situated rather backwards, a little over the base line of the eyes. Eyes rather small, oval, and a little over one-fourth the length of head, the space between the two being equal to the length of an eye. The post ocular bristle situated some good distance behind the eye is equal in length to that of the eye, and projects laterally across the gena; it is colorless and distally fimbriated or polyp shaped. Mouth cone broad at the base with the sides rounded, but abruptly narrowing towards apex, moderately pointed, and reaching middle of prosternum. Maxillary palpus with long bristles. Antennæ: about twice the length of head and filamentous. 1st joint strong and cylindrical, almost as broad as long; 2nd joint very strongly narrowed at base forming a distinct stalk and widening toward apex; 3rd to 7th slightly narrowed at base and broadening towards apex, where the sides are rounded; 4-7 almost of the same length and breadth; 8th closely and broadly connected with 7 and shaped like a long cone; 4 to 6 with distinct sense cones at apex, those of 6 being rather long.

Prothorax shorter than head, surface not so distinctly reticulate as the latter, fringed with numerous curved hyaline bristles which are dilated at the tip; the postero-lateral bristle long, curved, and fimbriated at tip; it is almost half as long as prothorax; other bristles comparatively small. Pterothorax longer and broader than prothorax, sides slightly convex. Legs: Femora, especially of the fore legs stout and incrassate, outer margin crenulate and fringed with numerous curved, more or less tubular bristles all along the margin, these bristles having slightly dilated tips; the tibia also with such bristles, but few in number; basal portion of tibia narrow and the outer margin curved. Fore-tarsus with a small, but distinct curved tooth at inner margin of the apex of basal joint. The mid and hind legs also more or less crenulated along margins and provided with numerous bristles, some of which are long and distinctly fimbriated. Wings: well developed, reach 7th abdominal segment, not narrowed in the middle, the margins of the fore wing appear more or less frilled up to the middle region; the fore margin slightly curved beyond the basal region; no duplicate hairs on fore wing. The 3rd basal bristle of fore wing long and curved; wing fringes greyish brown.

Abdomen at base almost as broad as pterothorax; the sides of the segments rather projecting and rounded laterally. All segments with long, curved, and distally fimbriated bristles. Two pairs of wing retaining bristles on each segment, sigmoid in shape. Each of the abdominal tergites from 3rd to 8th has towards its base a transverse narrow chitinous band showing a series of small buds like

projections, and each segment has a group of bristles along the dorso-lateral region, and the mid dorsal region of each segment has a distinct network area. Tube cylindrical but abruptly narrowed at middle, surface with distinct polygonal areas; it is shorter than the head, the latter being about 1·5 times longer. Abdominal bristles though strong, not longer than tube; tube bristles weak and pointed, not longer than tube, the outer bristle on 9th segment long and pointed.

Measurements of holotype female—length 2·2 mm.

Head length ·262 mm. breadth ·244 mm. Prothorax length ·206 mm. breadth ·356 mm.

Pterothorax breadth ·412 mm. Tube length ·172 mm. Antenna ·403 mm.

Length of joints in *u* I 44 II 55 III 62 IV 53 V 56 VI 55 VII 50 VIII 28.

Brachypterous female. Length 2 mm. Often paler than the winged female. The femur and tibia of the middle and hind legs more or less uniformly brownish, even with a slight tinge of reddish brown; this is the case with the tube, the distal joints of antenna, the apex of the mouth cone, and the median dorsal patch of the abdominal tergites; front legs much lighter in color. Wing pads very small, just showing the three basal bristles. Ocelli distinct, lateral abdominal bristles well developed.

Brachypterous male. Length 1·75 mm. similar to brachypterous female; ocelli distinct with pigment. The two specimens found were fungus attacked.

Described from a few winged females, a few brachypterous females and three brachypterous males, collected by the author from peculiar leaf galls on *Babul* (*Acacia leucophlœa*) in Bangalore (No. 73). There is found some color variation in this species ranging from reddish orange to bright yellow.

During the period September—October, a rosette of dark brown leaflets is noticed attached to the midrib of some distal leaves of this tree, and inside this rosette numbers of the insect are found in different stages; not found on the plant at other times of the year. It is a very striking species of gall thrips with unique features.

MALACOTHRIPS, Hinds. (*Proc. U.S.N. Mus.* XXVI, 1902, p. 200).

Malacothrips hispanicus, Bagnall, 1916.

Cephalothrips hispanicus, Bagnall, A.M.N.H. (9) XII, 1923, p. 629.
Malacothrips hispanicus, Bagnall, A.M.N.H. (9) XIV, 1924, p. 635.

Hab. and Loc. In Rhododendron flowers, Garhwal, N. India, 11,700 feet (*Imms* Coll.). Described from one male specimen.

ARRHENOTHRIPS, Hood. (*Ins. Insc. Menst.* VII, 1919, p. 198).

The pointed mouth cone connects this genus with *Liothripine* forms, while the peculiar widening of the apex of fore tibia carrying a tubercle shows affinity with the *Kladothripinæ*.

*Arrhenothrips dhumrapaksha,** n. sp.

Macropterous female. Length 2·5 to 3 mm. Colour—Dark to blackish brown, base of mouth cone and parts of thorax of a lighter shade ; eyes dark. Antennæ : 1st joint and base and inner margin of 2nd concolorous with head, apex of 2nd light brown ; 3rd to 6th yellow with a tinge of brown, especially towards apex of 5th and 6th ; 7th grey yellow ; 8th dark grey. Legs : the extreme tip of the fore femur, fore tibia, and tarsus brownish yellow, but the tibia with the outer margin distinctly lined with dark brown ; femora and tibiæ of other legs dark brown, and all tarsi yellow. Wings with a uniform yellowish grey infumation with the fringes brownish ; hind wings less cloudy. Head as long as or slightly shorter than prothorax, longer than broad. Eyes large, almost spherical ; post ocular bristle long and distinctly projecting laterally over the eye ; it is longer than the eye and dilated at tip. Cheeks with a distinct constriction immediately behind the eye, thence parallel towards base, crenulate with a few small sharp spines, one just behind the eye being conspicuous. Mouth cone with the labrum pointed and long, reaching middle of prosternum ; the cone does not as a whole appear to be quite pointed at apex. Antenna almost twice the length of head. 1st joint stout, almost as broad as long ; 2nd narrowed at base ; 4th to 6th narrow at base and widening towards apex, with the sides rounded ; 3rd to 6th almost of same length ; 4th longest ; 4th to 6th well supplied with sense cones on either side near apex.

Prothorax 1·5 times broader than long, rather narrow anteriorly ; posterior angular spines very conspicuous, longer than the post ocular bristle, and dilated at tip. Pterothorax with the lateral sides sub-parallel. Legs : front femur very stout and incrassate, being 5/6 as broad as head, tibia curved at inner margin near base ; inner margin of apex produced into a distinct tubercle carrying one or two bristles ; tarsus with a very strong, long and curved tooth, longer than the breadth of tarsus. Wings : of uniform breadth, with long fringes and reaching 6th abdominal segment ; forewing with 10 duplicate hairs ; the three basal bristles distinct and dilated at tip, 3rd longer than 2nd, and 2nd longer than 1st.

Abdomen long and provided with strong bristles ; the lateral margin of 8th segment slightly projecting about the middle ; bristles of 9th abdominal segment pointed, almost equal to the tube in length. Tube slightly shorter than the head.

Measurements of holotype female. Length : 3 mm.

Head length ·262 mm. breadth ·187 mm. Prothorax length ·300 mm. breadth ·450 mm. Tube length ·244 mm. Pterothorax breadth ·487 mm. Antenna length ·495 mm. ; joints in *u.* I 40 II 59 III 75 IV 81 V 72 VI 72 VII 59 VIII 37.

Macropterous male. Length 2·25 to 2·5 mm. Similar to female in color and in other features ; fore femur not so stout, the projection at the side of the 8th abdominal segment rather conspicuous.

* Cloudy wings.

Described from six females and two males collected by the author in leaf galls of *Ficus retusa* in Mysore (No. 159).

This species differs from *A. ramakrishnæ*, H. in having the wings cloudy, and in the different coloration of the antenna; the fore femur is not so stout as in that species. See fig. 8 (*b*).

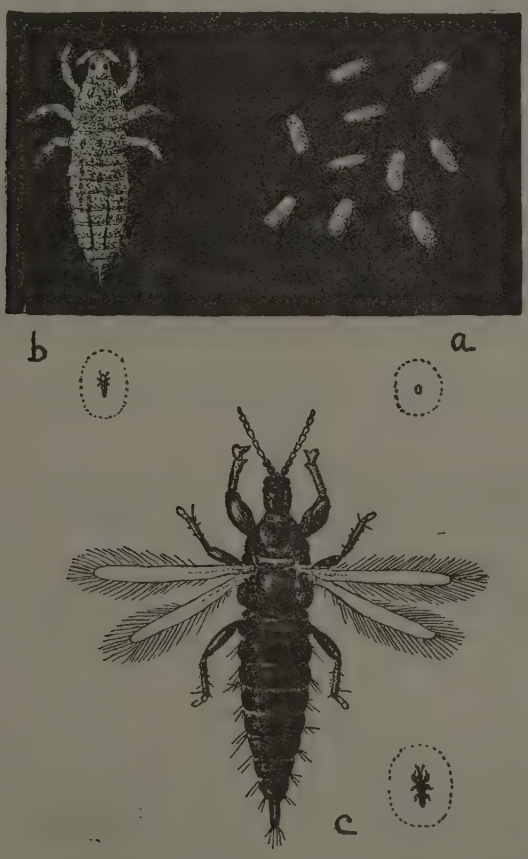


FIG. 25. *Arthenothrips ramakrishnae*, Hood on *Mimusops elengi* leaves; *a*, eggs; *b*, young; *c*, winged adult. All figures are magnified (× 16), the smaller figures within dotted lines showing the natural sizes.

Arrhenothrips ramakrishnæ, Hood. (Pl. XXXIII, fig. 1.)

Arrhenothrips ramakrishnæ, Hood, *Insec. Insc. Mens.* VII, 1919, p. 99.
Mesothrips ramakrishnæ, Bagnall, *A.M.N.H.* (9), XIV, 1924, p. 635.
Arrhenothrips ramakrishnæ, Karny, *Ent. Mem. Agr. Dept. Ind.* IX, 1926, p. 210.

Hab. and Loc. In leaf galls of *Mimusops elengi*, Coimbatore (No. 50). This insect is found on this plant throughout the year in Coimbatore causing considerable injury to the tender foliage; the lateral folds meet together forming a tube-like chamber in which the insect lives in all stages. See fig. 13 (*a*). The pre-adult nymph is yellowish white, with antenna, thorax, and abdomen fuscous; younger larvæ pale whitish yellow with the tube dark. The Anthocorid bug, *Montandoniola thripodes*, Berg, (fig. 14), is found predatory on this 'thrips,' both the larvæ and adult feeding on young and adult forms.

EURHYNCHOTHRIPS, Bagnall. (*A.M.N.H.* (9) I, 1918, p. 213).

Eurhynchothrips ordinarius, Hood. (Plate XXXIII, fig. 6.)

Liothrips ordinarius, H., *Ins. Insc. Men.* VII, 1919, p. 101.
Eurhynchothrips ordinarius, Karny, *Ent. Mem. Dept. Agr. Ind.*, IX, 1926, p. 210.

Hab. and Loc. In flowers of 'Agathi' (*Seshania grandiflora*), Coimbatore (No. 13). (See fig. 6*b*).

RHYNCHOTHRIPS, Hood. (*Proc. Ent. Soc. Wash.* Vol. XIV, 1912, p. 141).

Rhynchothrips pallipes, Karny (*Ent. Mem. Dept. Agr. Ind.*, IX, 1926, fig. 14, p. 211). (Pl. XXXIII, fig. 4.)

Hab. and Loc. Inside galls made by the Psyllid, *Megatrioza hirsuta*, C., on leaves of *Terminalia* sp., Mundakayam, Travancore; (No. 33).

This species is distinguished from others by the pale tibia of all the legs and the smoky cross band on the fore wings.

Rhynchothrips raoensis, n. sp.

Macropterous female and male. Length 2·25 to 2·40 mm. General colour chocolate to dark brown; the thorax, the inter-segmental parts of abdomen, apex of tube, and mouth cone of a lighter hue. Antenna: 1st and 2nd joints concolorous with head; apex of 2nd, 3rd, 4th, 5th, 6th and base of 7th yellow; apical part of 7th and the 8th dark grey, but much lighter than the body color: Legs: apex of fore femur, the fore tibia, the extreme apex of the mid and hind tibiæ, and all tarsi yellow, the fore tibia rather bright yellow. Wings with grey infumation, more conspicuous at base and along median longitudinal tract, extreme apex rather clear; hind wings less cloudy.

Head about 1·2 times longer than broad, vertex roundish anteriorly; cheeks more or less parallel and finely crenulate with a few small bristles. Eyes one-third as long as head; post ocular bristle almost as long as eye, slightly dilated at tip. Ocelli distinct. Mouth cone long and sharply pointed reaching apex of prosternum. Antenna about twice as long as head; joints 3 to 7 narrow at base and broadening towards apex; sides of joints 3 to 5 convex towards apex; joints 3 to 7 with long sense cones. The last joint is often ovoid, especially in the males; the 4th joint broadest next the 1st.

Prothorax shorter than head, bristles well developed and dilated at tip; the postero-lateral bristle half as long as prothorax. Pterothorax 1·5 times as broad as prothorax. Legs: fore femur stout and incrassate, fore tarsus unarmed. Wings broad, reach the 7th segment of abdomen; basal spines of forewing long and dilated at tip, the distal one longest of the three; 9 or 10 duplicate hairs at hind end of forewing.

Abdomen basally as broad as pterothorax, sides gradually arching towards tube. Tube comparatively short, only ·75 as long as head; the lateral bristles of abdominal segments and tube well developed; those of 9th segment as long as tube.

Measurements of holotype female, length 2·25 mm.

Head length ·247 mm. breadth ·209 mm. Prothorax length ·218 mm. breadth ·375 mm. Pterothorax breadth ·562 mm. Tube length ·187 mm. Antenna length ·453 mm; antennal joints in *u*—I 43 II 53 III 68 IV 72 V 65 VI 62 VII 59 VIII 31.

Described from about ten females and three males collected from leaf galls of *Mallotus philippinensis* at Taliparamba, Malabar, and in the Nilgiris by Y. R. Rao, after whom the species is named (Nos. 80 and 91); recently noted in flowers of 'cashew' (*Anacardium occidentale*) in Taliparamba, Malabar No. 207; (*A. G. R.* Coll.). Each lateral half of the infested leaf in this case is rolled towards the mid rib and the whole leaf is thus turned into a long tubular structure with the surface badly grooved and wrinkled. Larvæ have a pale olive green color.

This insect resembles the Javanese *Liothrips brevitubus*, Ky., from which, however, it differs chiefly in the size of the head and tube, the number of duplicate hairs to the forewing, and in the color of the fore tibia.

Rhynchothrips vichitravarna,* n. sp. Fig. 26.

Macropterous female, length 2·25 to 2·60 mm. Head, prothorax, and abdominal segments 5 to 9 inclusive light to dark brown, tube reddish brown. The abdominal segments usually of a darker brown than head and prothorax; pterothorax and abdominal segments 1 to 4 brownish to bright yellow. Front legs, excepting outer margins narrowly of femur, bright yellow; coxa and femur of mid

* Picturesquely coloured.

and hind legs, excepting outer margin narrowly of femora, yellow; all the four tibiæ dark and the four tarsi brownish yellow. Antenna: joints 1 to 5 bright yellow; 6th yellow basally, dark brown at apex; 7th and 8th uniformly dark brown. Eyes black; ocelli with red pigment. Forewings suffused with light grey, and the infumation is more conspicuous just before middle; hind wings less cloudy.

FIG. 26. *Rhynchothrips vichitravarna*, n. sp.

Head slightly longer than broad, cheeks rather arched, converging towards base, margins finely serrated with a few very short spines; occiput broadest behind eyes, surface reticulate with transverse striæ. Eyes rather small, spherical, ·75 as broad as long; ocelli large; post ocular bristles very conspicuous, longer than eye and dilated at tip. Mouth cone as long as prosternum and sharply pointed. Antenna 2·25 times as long as head, joints 3 to 6 long and narrow, constricted at base and broader towards apex; 8th joint very closely united with 7th; 2nd and 4th joints broader; 3rd and 4th with two long sense cones on each side towards apex, and one at apex of 5th outside very long.

Prothorax hardly shorter than head with all bristles well developed and dilated at tip; the postero-lateral almost half the length of the prothorax, curved, and dilated at tip. Pterothorax twice the length of prothorax, with sides very slightly arched and broader than base of abdomen. Fore femora stout and incrassate; a few small sharp spines along outer regions of the whole foreleg; foretarsus with a small triangular tooth just beyond the base. Wings moderately broad and no

constricted at middle, reaching 6th segment of abdomen ; the three basal bristles of forewing broadly dilated at tip, of almost equal length. Fore wings with 13 or 14 duplicate hairs.

Abdomen elongate, with the sides gradually arching and narrowing towards tube ; lateral bristles of segments well developed and dilated at tip, those of the 9th segment as long as tube. Tube shorter than head, breadth at base half its length ; the apical bristles long and slender.

Measurements of holotype female, length 2·60 mm.

Head length ·218 mm. breadth ·206 mm. Prothorax length ·206 mm. breadth ·390 mm. Pterothorax breadth ·468 mm. Tube length ·172 mm. Antenna length ·494 mm. Antennal joints in *u* I 43 II 59 III 84 IV 90 V 78 VI 62 VII 47 VIII 31.

Macropterous male. Length 2·25 mm. same colour as female ; head slightly shorter and broader ; the front femur and fore tibia stout, the former very broad, almost ·75 as broad as head ; fore tarsal tooth longer and stronger than in female.

Brachypterous male. Length 1·75 mm ; colour almost similar to macropterous forms, but the whole outer margin of fore femur lined with dark brown, and abdominal segments 7 to 9 rather blackish ; the tube reddish. Head as broad as long, eyes small, ocelli with pigment. Prothorax with the coxæ slightly broader than pterothorax ; the latter of same breadth as basal abdominal segments. Fore femur very stout and broad, as broad as head ; fore tarsus with a strong tooth. Wing pads transparent yellow, with the basal bristles broadly dilated at tip. Tube 8 the length of head ; 9th segment with scale like structures at base of tube.

Larva pale orange yellow with paler limbs.

Described from several females, a few macropterous males, and one brachypterous male collected by the author on *Eugenia jambulana* at Bangalore (No. 77), and on *Mimusops elengi* at Coimbatore (No. 140) ; it was in the material from Coimbatore that the brachypterous male was found. In this same lot were found a few forms much smaller in size than the type, ranging in length from 1·75 to 1·80 mm., but similar to the latter in other respects ; probably these are dwarf forms of the same insect.

In general appearance and especially in colour, this insect resembles *Empressmothrips combustipes*, Ky.,[1] to a great extent ; but the latter is apterous, its antenna has 7 joints, and the colour of the body is different in details.

Liothrips, Uzel (Mon. Ord. Thys., p. 261.)

*Liothrips kiriti,** n. sp.

Macropterous form length 2 mm. Colour dark greyish brown, the vertex of head in front of eyes, base of prothorax, posterior abdominal tergites, and base

[1] *loc. cit.*

*=[with a crown on the head.

of tube of a deeper hue; apical two-thirds of fore-tibia, apical half of the four hind tibiæ, and all tarsi light yellow; fore tibia brighter yellow. Antenna: 1st joint and the base and inner margin of 2nd brown; apex of 2nd and 3rd, 4th, 5th and 6th yellow, the basal part of these of a lighter shade than the distal; basal half of 7th light yellow, its distal half and the 8th grey. Wings with light yellowish infumation at base, clear towards apex.

Head twice as long as prothorax, and a little over 1·25 times as long as broad; vertex in front of eyes raised into a hoodlike fold carrying the front ocellus, the fold overhanging the bases of the antenna. Eyes large, facetted, a little over one-third the length of head; ocelli nearer the anterior margin of eyes. No prominent post ocular bristle present. Cheeks finely crenate with two or three isolated small bristles, one behind eye being longest. Surface of occiput with fine transverse striæ. Mouth cone comparatively short, but apex sharply pointed and almost reaching posterior margin of prosternum. Antenna less than 1·5 times length of head; 1st joint stout and cylindrical, as broad as long; 2nd more or less cylindrical; 3rd very long and narrow, its breadth being less than one-fifth the length; 4th slightly shorter than 3rd, and broadest of all next to the 1st; 5th and 6th about one-third as broad as long; 7th broadly connected with 8th; 3rd to 6th with long sense cones, one at inner margin of the apex of 6th very long.

Prothorax half as long as head; bristles few, and not conspicuous, postero lateral bristle half the length of prothorax and slightly dilated at tip. Pterothorax twice as long as prothorax; sides scarcely arched, almost as broad as base of abdomen posteriorly. Front femur stout and incrassate with a row of small sharp spines along outer margin; front tarsus hidden in the unique preparation. Wings well developed and reaching 8th abdominal segment, not narrowed in the middle; forewings with 13 duplicate hairs; the basal bristles yellowish, dilated at tips and comparatively short, being only 20 to 45 *u* in length.

Abdomen short and stout, elongate oval, the lateral margins of segments somewhat drawn out transversely; lateral bristles slightly dilated, those of 9th not longer than tube. Tube a little more than half the length of head, breadth at base being half the length.

Measurements of type, length 2 mm.

Head length ·337 mm. breadth ·262 mm. Prothorax length ·168 mm. breadth ·437 mm. Pterothorax breadth ·468 mm. Tube length ·187 mm. Antenna length ·526 mm; joints in *u* I 37 II 56 III 115 IV 94 V 75 VI 68 VII 50 VIII 31.

Described from a single specimen found by the author on mango leaf in Coimbatore (No. 96). The peculiar hoodlike structure on the vertex is more or less like *Leptothrips*, H., but the wings are not narrowed as in that genus; the comparatively short antenna with the very long and narrow 3rd joint does not agree with the recorded species of *Liothrips*. It agrees with *Liothripinæ*, however, in the long head and pointed mouth cone; until additional material is got for further study, it may be retained as a *Liothrips*.

Liothrips palasæ,* n. sp.

Macropterous male. Length 1·9 mm. Colour dark brown, base of mouth cone, pterothorax, and apex of tube lighter; ocelli with reddish pigment. Antenna: 1st joint concolorous with head, 2nd lighter toward apex and along outer margin, 3rd to 6th yellow with grey brown patch toward apex in each of them, and gradually increasing in depth from the 3rd joint to 6th; base of 7th light, rest of 7th and whole of 8th dark grey. Fore tibia yellow with dark brown margins, fore-tarsus yellow and other tarsi yellowish brown; extreme base of mid and hind tibiæ slightly paler. Wings clear except narrowly along margins which have a light grey infumation.

Head longer than thorax and as broad as long; cheeks finely crenate, subparallel. Eyes oval, slightly less than one-third the length of head, post ocular bristle conspicuous, almost as long as the eye and dilated at tip. Mouth cone sharply pointed, and almost reaching the base of prosternum. Antenna: almost twice the length of head, joints 3 to 7 almost of same length and about half as broad as long, 7th joint as long as the third, 4th and 5th longest, 1st to 5th of almost same breadth; middle joints narrow at base and broader towards apex.

Prothorax five-sixths the length of head; bristles moderately long and dilated at tip, postero-lateral as long as eye and a little over ·25 of the length of prothorax. Pterothorax twice as long as prothorax, sides almost parallel, with a few short spines. Front femur stout and incrassate, fore tarsus unarmed. Wings reach 6th abdominal segment, broad with 20 duplicate hairs at hind margin of fore wing.

Abdomen almost as broad as pterothorax at base and gradually narrowing towards tube, sides almost parallel, lateral bristles of segments dilated, those of 9th segment slightly longer than tube. Tube shorter than head.

Measurements of holotype female, length 1·9 mm.

Head length ·225 mm. breadth ·225 mm. Prothorax length ·187 mm. breadth ·319 mm. Pterothorax breadth ·375. Tube length ·172 mm. Antenna length ·422 mm. Antennal joints in *u* I 37 II 47 III 56 IV 62 V 62 VI 59 VII 56 VIII 43.

Brachypterous female. Length 2·75 mm.; longer than male, the tibiæ of mid and hind legs slightly lighter in colour; wing pads reaching base of abdomen; in other respects similar to male.

Described from one macropterous male and one brachypterous female, collected by the author in stem galls of the *Palas* plant (*Butea frondosa*), in Kadiyam Godavari (No. 118). The insects were found in company with some weevils in the galls.

Though regarded as a *Liothrips* the head does not appear to be appreciably longer than the prothorax, but is more like those of *Rhynchothrips*; and the existence of brachypterous forms in *Liothrips* is considered to be scarce.

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* Palas = *Butea frondosa.*

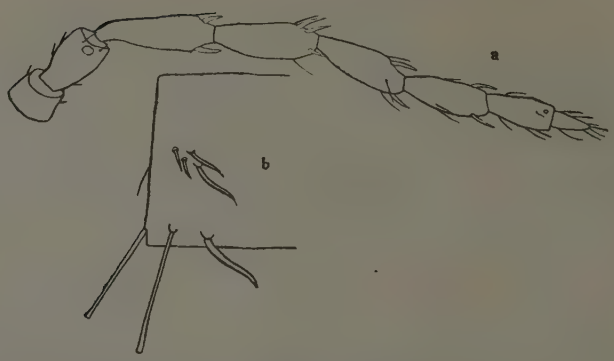

FIG. 27. *Dolichothrips ochripes*, Karny ; *a*, antenna ; *b*, chaetotaxy of sixth abdominal segment. (From Karny.)

DOLICHOTHRIPS, Karny. (*Zool. Anzeig*, L, 1912, p. 297.)

Dolichothrips ochripes, Karny. (*Ent. Mem. Agr. Dept. Ind.*, IX, 1926, p. 213, pl. XX, fig. 2.) (Pl. XXXIII, fig. 2.)

Hab. and Loc. In tender shoots of *Cassia auriculata*, Coimbatore (No. 28) ; noted on the same host in Guntur also (*V.M.*Coll.). This is the only species of the genus known from India so far ; the uniform ochraceous femora and tibiæ of all the legs, and the presence of an accessory wing-retaining spine separate this insect from all known species.

NEOHEEGERIA, Schmutz. (Ann. Nat. Mus. Wien, p. 344, 1909.)

Neoheegeria citripes, Bagnall. (*A.M.N.H.* (9) VII, 1921, p. 360.)

Hab. and Loc. On *Abutilon indicum ;* Pusa, Bengal (*Misra* coll.). One form has been recently noted on the same host in S. India ; though there are some slight differences, it may be considered for the present same as the Pusa species. *Y. R. R.* Coll. (Nos. 167, 169).

Neoheegeria fumipennis, Bagnall. (*A.M.N.H.* (9) VII, 1921, p. 360.)

Hab. and Loc. From unknown plant, Kurseong, Himalayas (*Gravely* Coll.).

Neoheegeria hrasvamukha,* n. sp.

Macropterous form. Length 2·35 mm. General colour chestnut brown with some red pigment in parts of abdomen ; the fore tibia and all tarsi lighter, almost

* Short-faced.

yellowish. Eyes black, ocelli with red pigment. Antenna: joints 1 and 2 concolorous with head; the rest of the antennæ missing in both the two specimens collected. The body has a more reddish tinge than the legs; apex of mouth cone dark. Wings clear at base, with very faint grey infumation beyond, conspicuous along the margins and at the central constriction.

Head longer than broad, occiput with fine transverse striæ; cheeks almost parallel, crenulate, and with a few small sharp spines, two or three toward the base and one or two behind the eye, rather conspicuous. Eyes oval, more than one-third the length of head; post-ocular bristles which are situated rather away from them, long and pointed, extending over half the eye. Mouth cone sharply pointed, but very short and extending only just to the middle of prosternum.

Prothorax shorter than head, the bristles well developed and all pointed, not dilated at tip; the postero-lateral one more than half as long as pronotum, and with one or two very small sharp spines on each side of it. Fore femora stout and incrassate; fore tarsus with a distinct tooth at base. Wings well developed, reaching 7th abdominal segment. Though distinctly narrow in the middle, the wing does not broaden out appreciably towards the apex, as is usual in *Haplothrips* and *Neoheegeria* species. Fore wing with 9 duplicate hairs; the basal bristles not dilated at tip, the distal one longest, about as long as the postero-lateral bristle of prothorax.

Abdomen rather long and narrow with the lateral bristles prominent, but not dilated at tip. Tube shorter than head. Bristles of 7th and 9th segment pointed and longer than tube.

Measurements of holotype form—length 2·25 mm.

Head length ·262 mm. breadth ·244 mm. Prothorax length ·187 mm. breadth ·390 mm. Pterothorax breadth ·468 mm. Tube length ·187 mm. Antennæ missing.

Described from two specimens collected on *Mallotus philippinensis* at Taliparamba, Malabar. (*Y. R. Rao* coll.); No. 80.

Though possessing distinct features of *Neoheegeria*, the pointed bristles, the short mouth cone, the more or less spiny cheeks, and the characteristic shape of the wings are rather peculiar. Unfortunately, the antennæ are missing in both the specimens.

Neoheegeria indica, Hood. (Pl. XXXIII, fig. 5.)

Neoheegeria indica, Hood, *Ins. Insc. Menstr.* VII, 1919, p. 96.
Neoheegeria indica, Karny, *Mem. Dept. Agr. Ind. Ent.* IX, 1926, p. 215.

Hab. and Loc. In *Ailanthus excelsa* shoots (No. 29*a*) and in shoots of Persian Nim (No. 29) Coimbatore. On a wild plant Dhony, Malabar (No. 70) and in shoots of *Cochlospermum gossypium* in Bangalore (No. 123). Karny maintains that *Dolichothrips varipes*, described by Bagnall (A.M.N.H., VII, 1921, p. 359) from material

collected by the writer from Coimbatore, is the same as Hood's *N. indica*, though some of the specimens show marked differences in size and form of the head.

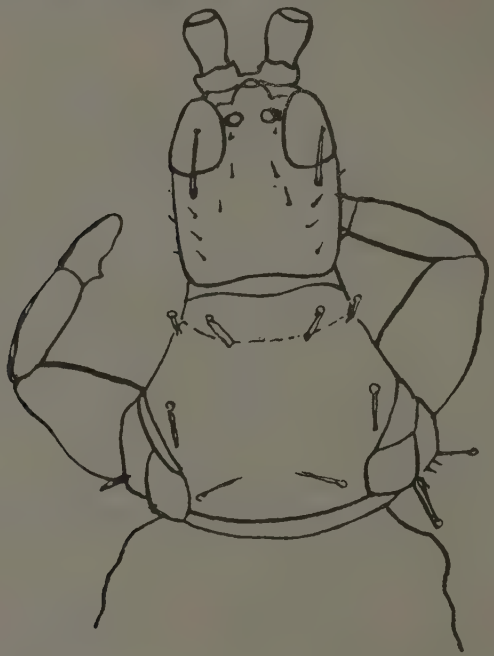

Fig. 28. *Neoheegeria indica*, H. Head and Prothorax (after Hood).

Neoheegeria Zizyphi, Bagnall. (*A.M.N.H.* (9) XII, 1923, p. 629.)

Hab. and Loc. *On Zizyphus rugosus*, Paresnath, Bengal.

Hindsiana, Karny. (*Mitt. Ver. Uni. Wien.* VIII, 1910, p. 41.)

Hindsiana apicalis, Bagnall. (*A.M.N.H.* (8) XV, 1915, p. 323.)

Hab. and Loc. On a jungle plant, Almora, N. India. (Coll.?) An apterous form agreeing with Bagnall's description of *H. apicalis*, has been collected in numbers on grass in Coimbatore recently. Bagnall does not say anything about the wings in his description.

Zygothrips Uzel. (*Monogr. Thysanop.* 1895, p. 243.)

Zygothrips andhra, n. sp.

Macropterous female. Length 1·3 mm. Colour brown, with plenty of red pigment on thorax and abdomen giving these parts a deep reddish colour. Antennal

joints 1-2 concolorous with head; joints 3 to 8 uniform pale brown; 3 to 5 somewhat lighter; ocelli with red pigment. Legs uniform greyish brown except part of fore tibia, and all tarsi which are pale whitish. Wings clear.

Head almost twice as long as prothorax, longer than broad, broadest behind eyes; cheeks arched and slightly crenulate; Eyes oval, one-third as long as head; post ocular bristle short, about as long as breadth of eye. Mouth cone round at apex just reaching middle of prosternum. Antenna a little shorter than 1·5 times the length of head, joints 2-6 almost equal; 4th to 7th of same shape; 4th broadest; 4th to 6th with narrow sense cones.

Prothorax very short, almost quadrate, not longer than tube; all bristles short and dilated at tip; postero-lateral about half as long as thorax. Pterothorax twice as long as prothorax, not very broad, sides almost parallel. Wings small, reaching 7th abdominal segment; fore wings with 7 duplicate hairs, bristles at base very short and bluntly pointed.

Abdomen elongate oval, as broad as, or slightly broader than pterothorax, longer than head and thorax together; bristles of posterior segments not dilated. Tube slightly shorter than prothorax, the apical bristles longer.

Measurements of type female length 1·5 mm.

Head length ·187 mm. breadth ·150 mm. Prothorax length ·103 mm. breadth ·143 mm. Pterothorax breadth ·218 mm. Tube length ·097 mm. Antenna length ·262 mm. Antennal joints in *u* I 22 II 37 III 37 IV 43 V 40 VI 37 VII 31 VIII 15.

Described from a single female collected by the author on *cholam* shoots in Guntur, Madras Presidency (No. 152).

HAPLOTHRIPS, Amyot and Serville (*Hist. Nat. Ins. Hemipt.* 1843, p. 640).

This genus is represented in India by numerous species, and includes the commonest among Tubulifera found in flowers; some of the forms are so very closely related to each other that it is often found difficult to separate them. This may be possible when plenty of material becomes available for comparison.

Haplothrips ceylonicus, Schmutz.

Haplothrips ceylonicus, Schmutz, *Sitzb. Ak. Wiss.* CXXII, 1913, p. 1038.

Haplothrips ceylonicus, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 217.

Hab. and Loc. In flowers of *lantana*, jasmine and mango; Coimbatore (Nos. 44, 27, 38); in flowers of coconut, Kadiyam, (No. 116); on different flowers, Bangalore (No. 144); on mango flowers, Anakapalli (No. 110).

In a recent paper [1] Hood states that this species is the same as *Karnyothrips flavipes*, Jones.

var veroniæ, Priesner, found in some wild flowers, Coimbatore (No. 142).

[1] *loc. cit.*

Haplothrips ganglbaueri, Schmutz.

Haplothrips ganglbaueri, Schm., *Sitz. Ak. Wiss.* CXXII, 1913, p. 1034.
Haplothrips ganglbaueri, Karny, *Ent. Mem. Dept. Agr.* IX, 1926, p. 217.

Hab. and Loc. On wild plant, Coimbatore (No. 18); in jasmine flowers, Kollegal (No. 125); one apterous and one brachypterous form found in this material.

Haplothrips inquilinus, Priesner [1] (*Treubia* II, 1921, p. 6).

Haplothrips inquilinus, Priesner, *Treub.* II, 1921, p. 6.
Hapothrips inquilinus, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 216.

Hab. and Loc. On *Mimusops elengi*, Coimbatore (No. 50); on *Eugenia*, Nellore (No. 84). This species was first described from Java.

Haplothrips pictipes, Bagnall (*A.M.N.H.*, IV, 1919, p. 273).

Hab. and Loc. On diseased berries of black pepper collected by the author at Taliparamba, Malabar; September 1918 (No. 203*b*). From the material containing this insect from Taliparamba the author has recently mounted some specimens which, though resembling *pictipes*, B in many respects, show the anterior femora and tibia armed as in Hood's *Euoplothrips* (1918) from Queensland. It is expected to study this form and publish the results in a future paper.

Haplothrips ramakrishnai, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 218, fig. 19).

Hab. and Loc. In chrysanthemum flowers, Coimbatore (No. 20). The writer has noted a post ocular bristle in specimens collected later, though it was not visible according to Karny in the type specimen; it is minute and situated some distance behind the eye. (See fig. 5.)

Haplothrips soror, Schmutz. (Pl. XXXIII, fig. 3.)

Haplothrips soror, Sch., *Sitz. Akad. Wis.* CXXII, 1913, p. 1039).
Haplothrips soror, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 216.

Hab. and Loc. In chrysanthemum and *lantana* flowers, Coimbatore (Nos. 20 and 44).

Haplothrips tenuipennis, Bagnall (*A.M.N.H.* (9) I, 1918, p. 210).

Hab. and Loc. On tea bushes, Darjiling (Andrews coll.). This has been noted as a pest on tea with another species, *Physothrips setiventris*, B.

[1] *loc cit.*

GNOPHOTHRIPS, Hood[1] (*Jour. N. Y. Ent. Soc.* XXIII, 1915, p. 133).

Gnophothrips kabandha, n. sp.

Brachypterous female. Length 1·5 mm. Greyish yellow, parts of thorax dark grey, abdomen dark brown, especially the posterior margin of the segments. Legs yellow diffused with grey, especially over basal portion of all femora; ventral tips of all tarsi dark. Eyes dark, anterior ocellus (only one clear) with red pigment. Antenna 1st joint yellow, 2nd to 4th yellow, 2nd rather pale and 3rd and 4th with slight touch of grey, 5th to 8th uniform dark grey with 5th slightly paler than the rest.

Head of large size very long and broad, 1·5 times as long as prothorax, broadest across eyes; cheeks slightly converging towards base. Eyes very small and situated far apart, length of eye one-sixth that of head and the space between them three times the breadth of each eye; only the front ocellus clear, rather forward on the vertex which is slightly produced anteriorly, post ocular bristle very minute one-fifth the length of each eye, cheeks smooth. Mouth cone very broadly rounded reaching base of prosternum. Antenna less than 1·5 times the length of head, 1st joint broadly oval, 2nd narrow at base and widening towards apex, 3rd with a distinct collar-like constriction just beyond base, 4th almost similar to 3rd, 5th narrow at extreme base. broader towards apex, 6th with a basal stalk, 6th, 7th and 8th closely united, 3rd longest and 2nd broadest, 4th and 5th with long sense cones, especially the 5th.

Prothorax small, bristles very small and weak, the postero lateral one-third as long as prothorax, not dilated at tip. Pterothorax 1·25 times longer than prothorax, 1·75 times broader than long, sides slightly arched. Front femur rather stout and incrassate but not armed; front tarsus with a small curved tooth. Wings vestigial.

Abdomen broadly oval with the sides rounded posteriorly; broader than pterothorax, segments much broader than long; lateral bristles not dilated, those of 9th segment not longer than tube. Tube almost as long as prothorax; breadth at base more than half its length.

Measurements of type, length 1·5 mm.

Head length ·300 mm. breadth ·255 mm. Prothorax length ·187 mm. breadth ·375 mm. Pterothorax breadth ·393. Tube length ·168 mm. Abdomen breadth ·487 mm. Antenna length ·426 mm. Antennal joints in μ I 40 II 59 III 81 IV 75 V 59 VI 47 VII 34 VIII 31.

Described from a single specimen collected by the author under bark of Rain tree (*Pithecolobium saman*), Coimbatore (No. 106). The species differs from Hood's *megaceps* from Florida chiefly in colour, in the structure of the 3rd antennal joint, and in the presence of a fore tarsal tooth. It is possible that this insect may prove

[1] *loc. cit.*

a new genus; a study of further material may afford further differences between this insect and the American *Gnophothrips*. For the present it may be regarded as a species of that genus.

Brachythrips, Reuter.

(Act. Soc. Faun. Flor. Fenn., xvii, p. 17, 1899.)

Three new forms are described in this paper provisionally under this genus though there are found some differences between these and Reuter's type *B. flavicornis*, *R.* They show close affinities with *Eothrips* and *Austrothrips* and may have to be included in one of these, or a new genus may have to be erected in their vicinity.

Brachythrips dantahasta,* n. sp.

Macropterous female. Length 1·5 to 1·8 mm. Colour yellowish to dark grey, some specimens lighter yellow and even brownish. Occiput, feet, and pterothorax, yellowish brown; prothorax, abdomen, and base of tube darkish. Eyes dark, ocelli with red pigment. Margins of femoræ and tibiæ suffused with dark brown in some, tarsi yellowish, Antenna: 1st and base of 2nd concolorous with head; distal part of 2nd, 3rd and 4th yellow; 5th yellow with a touch of brown; 6th yellowish brown deeper towards apex; 7th and 8th dark grey. Fore wings with uniform pale grey cloud; hind wings almost clear.

Head broader than long, vertex arched in front, cheeks parallel behind eyes, slightly crenate with a small spine behind eye; surface with distinct transverse striæ with polygonal areas between the eyes. Eyes almost spherical; post ocular bristle about half the length of eye and not dilated at tip; a small bristle behind each posterior ocellus. Mouth cone broadly pointed reaching base of prosternum, labrum pointed. Antenna 1·75 times as long as head, joints comparatively short and stout, 2nd joint cylindrical, 3rd narrow at base and broader towards apex with the sides rounded; 4th almost spherical broader than all the joints except 1st and 2nd; 6th distinctly constricted at base, forming a stalk, 7th as long as 6th; 8th broadly united to 7th. In one specimen joints 5 and 6 found united into one piece; 4th to 6th with well developed sense cones.

Prothorax almost as long as head, all bristles well developed and pointed; postero lateral about half as long as prothorax. Pterothorax with sides slightly arched. Legs stout, especially the fore pair; fore femora stout and broad, half as broad as head, fore tibia broadest towards apex, fore tarsus with a long, slightly curved tooth in both sexes, length of tooth ·75 times breadth of tarsus. Wings broad without constriction, reach 7th abdominal segment; fore wing with from 8-10 duplicate hairs, basal spines clear, 1st shorter than 2nd and 3rd.

Abdomen with the spines of posterior segments long and pointed, basal abdominal segments almost as broad as pterothorax, the lateral bristle of 9th segment as long as tube. Tube as long as prothorax, at base half as broad as long.

* With toothed fore-limb.

Measurements of holotype female. Length 1·8 mm.

Head length ·205 mm. breadth ·243 mm. Prothorax length ·187 mm. breadth ·412 mm. Pterothorax breadth ·450 mm. Tube length ·187 mm. Antenna length ·356 mm. Antennal joints in μ I 34 II 50 III 56 IV 47 V 50 VI 47 VII 47 VIII 25.

Macropterous male. Length 1·5 mm. Similar in most respects to female. Fore femora somewhat stouter than that of female and tube somewhat longer.

Described from about a dozen specimens collected by J. A. Mulyil in leaf galls of *Memexylon* sp., Mangalore, South Kanara (No. 76). The toothed fore tarsus distinguishes this from the two other species described below. In this material two dwarf forms were also found.

Brachythrips dirghavadana, * n. sp.

Macropterous male and female. Length 1·60—1·75 mm. Colour uniform ochraceous brown; front tibia, middle joints of antenna, junctions between all femora and tibiæ, and all the tarsi of a slightly paler hue; the occiput prothorax and the posterior tergites of abdomen including tube rather dark. First two joints of antenna somewhat paler than head; 3rd to 8th more or less uniformly light yellowish brown. The margins of all femora and tibia vary narrowly and the margins of the mouth cone and the upper lip dark brown. Eyes dark; ocelli with red pigment. Fore wings with light grey infumation, the hind wings somewhat less cloudy.

Head distinctly wider than long and as long as prothorax, vertex in front more or less rounded; cheeks sub-parallel diverging towards base where the head is broadest; occiput with faint transverse striæ. Eyes ovoid, ocelli distinct; post ocular bristle ·75 the length of eye, not dilated at tip. Mouth cone long and rounded in outline, with the labrum very long and distinctly pointed, and extending beyond the cone to middle of mesosternum. Antenna about 1·5 times as long as head; the middle joints comparatively short and broader; 4th, 5th and 6th as broad as long; 7th as long as the 2nd, 3rd, or 4th; 6th distinctly constricted at base, forming a clear stalk, 8th closely united to 7th and cone shaped.

Prothorax more than twice as broad as long, lateral angles strongly rounded; all the bristles of moderate length, the postero-lateral less than half the length of prothorax. Pterothorax and basal abdominal segments almost of same breadth. Legs. Front femora stouter than the others and slightly incrassate, fore tibia narrow at base and the inner margin at that region slightly curved; fore-tarsus unarmed. Wings: broad with a slightly curved fore margin, of same breadth throughout and extending to 7th abdominal segment. Fore wings with 6 or 7 duplicate hairs.

Abdomen: segments more or less of same breadth to 7th segment; lateral spines strong, not dilated at tip. Two pairs of wing-retaining spines distinct, posterior pair stronger and sigmoid.

* With long mouth.

Measurements of holotype female. Length 1·60 mm.

Head length ·156 mm. breadth ·206 mm. Prothorax length ·156 mm. breadth ·356 mm. Pterothorax breadth ·375 mm. Tube length ·162 mm. Antenna length ·322 mm. Antennal joints in μ I 34 II 47 III 50 IV 43 V 43 VI 40 VII 40 VIII 25. Male slightly smaller in size.

Described from about ten females and four males collected by the author from leaf galls of *Ficus retusa* in Mysore (No. 75) and one specimen on ' daincha ' (*Sesbania ægyptiaca*) in Gudiyatum collected by T. S. Ramachandran (No. 102).

The striking feature of this insect is the extraordinarily long and pointed labrum ; but for the rounded outline of the mouth cone, the insect would easily be mistaken for a *Liothripine* species.

Brachythrips perandaphaga, n. sp.

Macropterous female. Length 2 mm. General colour dark greyish brown with a pale yellow tinge in some specimens ; head and base of tube rather dark ; apex of tube lighter ; the tibia and tarsus of all legs yellow, but the outer margin close to the base of the front tibia and a little more of the mid and hind tibiæ brown. Antenna : 1st joint somewhat paler than head, 2nd still lighter, almost yellowish except at extreme base, and narrowly along inner margin ; 3rd to 6th yellow ; 7th light grey, 8th dark grey. Eyes dark, both ocelli and eyes with some red pigment. Wings : with a thin grey infumation, more towards base than distally, extreme base light yellowish brown.

Head clearly broader than long, vertex scarcely produced between the bases of antenna ; cheeks parallel and finely crenulate ; Eyes rather small roundish, space between the two about 1·5 times the breadth of one. Post ocular bristle almost as long as the eye, projecting conspicuously beyond gena and hardly dilated at tip. Occiput with fine transverse striæ. Mouth cone broadly rounded with the labrum sharp, and reaching posterior margin of prosternum. Antenna : 1st joint stout and cup-shaped, almost as broad as long ; 2nd slightly constricted at base ; 3rd to 6th narrow basally and broader, with the sides rounded toward apex, 3rd to 6th sub equal, 7th broad and truncate distally, 8th with shape of a long cone.

Prothorax as long as head or slightly shorter, the postero-lateral angles rounded ; all bristles well developed and slightly dilated at tip, the postero lateral one longest, being half as long as the prothorax. Pterothorax with sides slightly arched, not appreciably broader than the base of abdomen. Legs : fore femur stout and slightly incrassate, with a few very small sharp spines along outer margin ; front tarsus unarmed. Wings : broad, reaching 7th abdominal segment ; fore wings with 7 duplicate hairs ; basal 3 bristles distinct and dilated at tip, basal one shortest.

Abdomen: with the sides slightly convex, lateral bristles well developed, those of 9th segment long, but not longer than the tube and not dilated at tip. Only one well defined pair (the posterior pair) of wing retaining bristles found on each abdominal tergite. Tube almost as long as head or a little shorter; at base as broad as half the length.

Measurements of holotype female. Length 2 mm.

Head length ·218 mm. breadth ·244 mm. Prothorax length ·206 mm. breadth ·453 mm. Pterothorax breadth ·525 mm. Tube length ·206 mm. Antenna length ·450 mm. Antennal joints in μ I 37 II 59 III 72 IV 65 V 62 VI 59 VII 56 VIII 37.

Brachypterous female. Length 2 mm. similar to macropterous form; body and legs rather stout, eyes small and roundish, wings very much reduced as transparent pads showing the distally dilated basal spines; bristles on abdominal tergites rather small; ocelli present.

Brachypterous male. Length 1·75 mm. similar to brachypterous female, but smaller; ocelli large. No winged male found.

Described from many macropterous and some brachypterous females, and a few brachypterous males collected by C. K. Subramanian on *Perandai* (*Vitis quadrangularis*), a common Indian creeper in Coimbatore (No. 74), with the species *Eothrips aswamukha*, n. sp.

Austrothrips, Brethes. (*Ann. Mus. Buenos Aires*, 1915, p. 89.)

Austrothrips cochinchinensis, Karny. (fig. 7·)

Austrothrips cochinchinensis, Ky., *Jour. Siam. Socy.* XVI, 1923, p. 113.
Austrothrips cochinchinensis, Ky., *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 219.
Austrothrips cochinchinensis, Rao, *Agr. Jour. Ind.* XIX. p. 436, 1923.

Hab. and Loc. In galls of the climber, *Calycopteris floribunda*, all along the Western Ghats in S. India (No. 34). Noted also in galls of *Cordia Myxa*, Dehra Dun, (*T. V. V. Ayyar* Coll.) The insect is found in conspicuous galls as big as one's fist. See fig. 13 (*b*). Species of *Androthrips* are often found in the same gall.

Cecidothrips, Kieffer.

Cecidothrips bursarum, Kieffer (*Marcellia* VII, 1909, p. 165).

Hab. and Loc. From unknown plant galls, Trichinopoly; (coll ?)

TRICHOTHRIPS,* Uzel. (*Monograph of Thysanoptera*, 1895, p. 246.)

Trichothrips hadrocerus, Ky. (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 220).

Hab. and Loc. In leaf galls of a wild plant at Sengleteri (3000 feet), Tinnevelly (No. 7). The galls in this case consist in the formation of a thick hard tubular structure of the leaf, often affecting only one lateral half of it.

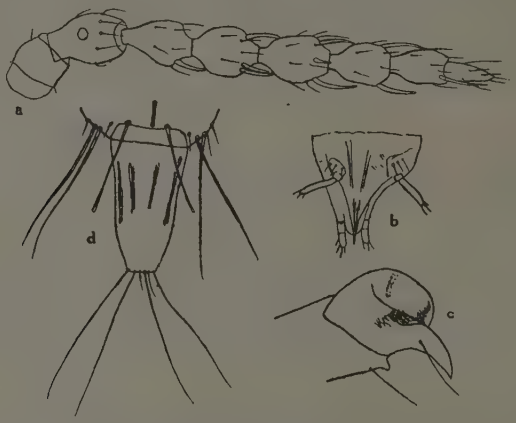

FIG. 29. *Trichothrips hadrocerus*, Karny, macropterous ♀, *a* antenna ; *b* mouth cone ; *c* fore tarsus ; *d* tube. (From Karny).

There are one or two forms in the author's material which appear to be species of *Trichothrips*, but for want of sufficient material for better study, they are not described here.

EOTHRIPS, Hood. (*Entomologist* XLVIII, 1915, p. 106.)

Eothrips foliiperda, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 222, fig. 22).

Hab. and Loc. In leaf galls of *Pothos scandens*, Taliparamba, Malabar (Nos. 3, 4 and 90). The foliage of this plant often suffers very seriously. The leaf is longitudinally rolled up and its colour gradually changes to a sickly yellow ; in later stages the galled leaf becomes brittle.

Eothrips coimbatorensis, n.sp.

Macropterous female. Length 1·60-1·80 mm. Colour dark brown with parts of thorax, base of abdomen, and apex of tube lighter. Fore tibia yellow, but with the base and both margins narrowly brownish for half the length ; all tarsi

* According to Priesner this genus is same as '*Hoplothrips*' of Serville 1843.

yellow. Antenna: 1st, and base and inner margin of 2nd joint having colour of head, apex of 2nd and 3rd yellow; 4th and 5th yellow with some brownish tinge at apex; 5th with a deeper tinge of greyish brown at apex; 6th, base yellow, distal portion grey; 7th and 8th dark grey; 4th to 6th show clear brownish tinge towards apex. Wings with light grey infumation, clearly brownish at base; the infumation is clear along median longitudinal region up to the middle, and very faint towards apex.

Head very slightly broader than long, of uniform breadth behind eyes, which are rather small and not projecting; ocelli distinct placed forwards near anterior border of eyes. Post ocular bristle pointed and ·75 times the length of eye. Cheeks finely crenate with a few inconspicuous small bristles. Mouth cone short and triangular and roundly pointed at apex, extends to, or a little beyond the middle of prosternum. Antenna twice the length of head, 3rd longest, 4th broadest, 4th to 7th almost of same length and form.

Prothorax slightly shorter than head, all bristles pointed. Pterothorax broader than prothorax, sides slightly convex. Legs: fore femur somewhat stout; fore tarsus not toothed, all femora with small sharp spines along margin. Wings broad and reach 8th abdominal segment; the 1st basal spine of forewing unusually small, only one-sixth of the distal spine, all dilated at tip; forewings with 7 duplicate hairs.

Abdomen almost parallel sided up to 6th segment; 8th segment rounded; lateral bristles long and pointed, those of 9th segment as long as tube. Tube shorter than head, but as long as, or slightly longer than prothorax.

Measurements of holotype female length 1·80 mm.

Head length ·208 mm. breadth ·225 mm. Prothorax length ·168 mm. breadth ·356 mm. Tube length ·187 mm. Pterothorax breadth ·450 mm. Antenna length ·408 mm. Antennal joints in μ I 40 II 53 III 72 IV 59 V 59 VI 53 VII 47 VIII 25.

Macropterous male slightly smaller—1·5 mm. long and of a lighter colour the apex of abdominal segments darker appearing like transverse stripes. Described from six females and two males collected on a wild plant in Coimbatore (No. 69). This insect resembles closely the two Javanese species *laticauda* K. & *nervisequus* K.

*Eothrips aswamukha,** n. sp.

Macropterous female and male. Length 1·25 to 1·70 mm. Colour pale to dark reddish brown, occiput, abdomen and base of tube of deeper hue; front tibia and all tarsi yellow suffused with brown, the extreme apices of femora and tibia also slightly paler in colour in some specimens. Antenna: the 1st joint and base and inner margin of 2nd light brown; 3rd to 6th yellow suffused with brown, the apex of each more brownish; 7th and 8th grey brown, the brown tinge in the joints increases gradually from the 3rd to 6th. Wings with faint grey infumation which

* = With face of a horse.

is conspicuous along margins and at the basal region ; wings rather clear from beyond the middle, yellowish brown at the region of the basal spines.

Head almost as broad as long, vertex very slightly produced in front between the antennæ ; cheeks converging towards base, finely crenate, occiput broadest behind eyes ; eyes ovoid, slightly projecting ; post ocular bristle almost as long as eye, projecting laterally from near base of eye and pointed. Mouth cone moderately long and very broadly round at apex and in some even widened laterally near apex, reaching the base of pronotum. Antenna : 1st joint cup-shaped, 2nd cylindrical, 3rd to 7th almost of same form, narrow at base and broader with the sides rounded towards apex, 4th broadest.

Prothorax conspicuously shorter than pterothorax ; the bristles not dilated ; the postero-lateral bristle half the length of head, those near the anterior angles project out laterally. Pterothorax with sides slightly arched and much broader than prothorax. Legs short and stout, front femur stouter, fore-tarsus unarmed. Wings broad, reach 7th or 8th abdominal segment, forewing with 7 duplicate hairs ; basal bristles almost of same length and not dilated at apex.

Abdomen with clearly arched sides, almost oval in some specimens ; bristles of posterior segments well developed and not dilated at tip ; the lateral bristle of 9th segment pointed and almost as long as tube. Tube shorter than head.

Measurements of holotype female length 1·5 mm.

Head length ·218 mm. breadth ·206 mm. Prothorax length ·168 mm. breadth ·337 mm. Pterothorax breadth ·375 mm. Tube length ·181 mm. Antenna length ·402 mm. Antennal joints in μ I 28 II 50 III 75 IV 65 V 56 VI 53 VII 47 VIII 28.

Described from about a dozen specimens collected on *Perandai* (*Vitis quadrangularis*), a common Indian creeper, in Coimbatore by C. K. Subramanium, with *Brachythrips perandaphaga*, n. sp. (No. 74).

Eothrips jambuvasi,* n. sp.

Macropterous female and male. Length 1·5 mm. Colour dark grey brown, base of mouth cone and portions of pterothorax lighter ; fore tibia except the outer margin near extreme base, apical half of mid and hind tibiæ, and all tarsi pale yellow Antennæ : 1st joint concolorous with head, 2nd brownish yellow, 3rd pale yellow, 4th to 6th yellow, 7th brownish yellow, lighter at base, 8th grey. Wings with very pale greyish infumation ; at base grey brown.

Head as long as broad, longer than prothorax ; eyes large and oval, cheeks very slightly arched, occiput of almost the same breadth behind eyes, with faint transverse waves on surface ; ocelli rather forwards. Post ocular bristle rather short, about half as long as the eye. Mouth cone short and broadly rounded at apex, reaching middle of prosternum or slightly beyond. Antennæ slightly more

* Living on the plant 'Jambu' *Eugenia*.

than 1·5 times the length of head, the middle joints compact, comparatively short and broad; 1st, 3rd, 4th, 5th, and 6th of the same length, and almost of the same breadth; 2nd and 7th equal and longer than others; 3rd to 6th, all distinctly narrowed at base and roundly broad apically, more or less wine-glass shaped; 7th elongated and of almost same breadth throughout, 2nd broadest; 8th broadly connected to 7th and in some specimens almost oval in shape.

Prothorax shorter than head, with the bristles weak; the postero lateral less than one-third the length of pronotum. Pterothorax about thrice as long as prothorax with sides almost parallel. Legs short and stout, fore femur stouter, and fore-tarsus unarmed. Wings reach 7th abdominal segment, not narrowed in the middle; forewings with 8 to 10 duplicate hairs.

Abdomen elongate with sides almost parallel up to seventh segment, bristles moderately developed and pointed, lateral bristle of 9th segment as long as, or slightly longer than tube. Tube a little over half the length of head.

Measurements of holotype female length 1·60 mm.

Head length ·187 mm. breadth ·187 mm. Prothorax length ·150 mm. breadth ·281 mm. Pterothorax breadth ·356 mm. Tube length ·112 mm. Antenna length ·295 mm. Antenna joints in μ I 37 II 47 III 34 IV 37 V 37 VI 34 VII 44 VIII 25.

Described from about a dozen females and half a dozen males collected by the author from leaf galls on *jambu* tree (*Eugenia* sp.) on Marudamalai hills, 2,000 feet, near Coimbatore (No. 127). The gall formation in this case is confined to the lateral margins of the leaf along which small tubular galls are formed by the folding of the leaf edges towards the under surface; inside these small chambers both adults and young ones are found. This species very closely approaches *E. crassicornis* Ky. but is different in colour, and in the form of the antennæ.

ANDROTHRIPS, Karny (*Marcellia* XI, 1912, p. 153).

Androthrips flavipes, Schmutz.

Androthrips flavipes, Schm., *Sitz. Akad. Wiss.* CXXII, 1913, p. 1931.
Androthrips flavipes, Bagnall, *A. M. N. H.* (8) XIII, 1914. p. 27.
Androthrips flavipes, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 224, fig. 23.

Hab. and Loc. In leaf galls of *Ficus retusa*, Kollegal with *Gigantothrips elegans* (No. 2); in leaf galls of *Mimusops elengi*, Coimbatore (No. 140); in Psyllid galls on *Terminalia* leaves, Travancore (No. 33). There are a few distinct varieties of this species found in S. India and further studies must be made to verify these.

Androthrips ramachandrai, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 226, fig. 24).

Hab. and Loc. From galls of climber, *Calycopteris floribunda*, Travancore and Taliparamba (No. 34); found with *Austrothrips cochinchinensis*, Karny.

GYNAIKOTHRIPS, Zimmerman (*Bull. Inst. Bot. Buitenzorg.* VII, 1900, p. 13).

Gynaikothrips chavicæ, Zimmerman.

Gynaikothrips chavicæ, Z., *Bull. Inst. Buitenzorg.* VII, 1900, p. 14.

Gynaikothrips chavicæ, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 234.

Hab. and Loc. In small leaf galls of black pepper (*Piper nigrum*), collected by the author in Wynaad, Malabar (No. 31).

Gynaikothrips interlocatus, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 237).

Hab. and Loc. Inside galls of a Psyllid in *Terminalia* leaves, collected by the author in Mundakayam, Travancore (No. 33). See fig. 2*b*.

Gynaikothrips malabarica, n. sp.

Macropterous female and male. Length 2·12 to 2·5 mm. Dark to greyish brown; base of mouth cone, parts of thorax and inter-segmental parts of abdomen paler; fore tibia, except extreme base (which is greyish), the distal two-thirds or three-fourths of the mid and hind tibiæ and tarsi pale whitish yellow. Antenna: 1st joint and base and inner margin of 2nd concolorous with head, rest of 2nd and 3rd to 8th uniform pale yellow with the lateral margins of 3-7 narrowly grey; 8th rather pale. Eyes black, ocelli pale brown, both with some pigment. Wings clear. Postero-lateral spine of prothorax yellowish.

Head very slightly longer than broad, cheeks sub-parallel, somewhat diverging towards base, if at all, with a few small sharp bristles; occiput with numerous distinct transverse striæ. Eyes oval, broader behind; ocelli above a line across the middle of eyes; post ocular bristle about half the length of eye, not dilated at tip. Mouth cone broadly triangular and roundly pointed, reaching almost the base of prosternum. Antenna 1·5 times longer than head; joints 3-6 almost of the same length, narrow at base and broader towards apex; 8th broadly joined to 7th.

Prothorax and pterothorax with transverse striæ and even with polygonal areas at sides of the latter. The postero-lateral spine long, slightly curved and dilated at tip; t is more than half the length of prothorax. Pterothorax with sides somewhat serrate and with a few minute spines, the last one sharp and slightly curved. Legs: Fore femur rather stout with small sharp spines along outer margin, fore tarsus with a tooth towards apex of basal joint. Wings reach 6th abdominal segment, are broad, and have 14 duplicate hairs on the fore wing.

Abdomen much narrower than pterothorax and with sides almost parallel up to 7th segment; bristles slightly dilated or bluntly pointed; lateral bristle of 9th segment almost as long as tube. 8th segment slightly bulged out laterally. Tube as long as the head.

Measurements of holotype female. Length 2·5 mm.

Head length ·281 mm. breadth ·256 mm. Prothorax length ·187 mm. breadth .300 mm Tube length ·281 mm. Pterothorax breadth ·468 mm. Antenna length ·435 mm. Antennal joints in μ I 25 II 47 III 75 IV 65 V 68 VI 68 VII 53 VIII 34.

Described from four females and three males collected by the author from the leaves of the ' Banyan ' tree (*Ficus indica*) in North Malabar (No. 81). The insects are found inside the rolled tubular edges of tender leaves ; in company with *Gigantothrips elegans*, Z.

This species comes close to *G. uze'i* from which, however, it differs in the pale mid and hind tibiæ ; it also differs from *G. inquilinus* K in the more numerous duplicate cilia of fore wings.

Gynaikothrips moultoni, n. sp.

Macropterous male. Length 2·25 mm. General colour greyish to dark brown. Head and base of tube somewhat darker than pterothorax and apex of tube which are lighter. Antenna : 1st joint and base of 2nd concolorous with head, distal part of 2nd pale brown, 3rd to 8th uniform pale yellow. Legs : ront tibia bright yellow : apex of fore femora, extreme apex of the hinder four tibiæ, and all tarsi pale whitish yellow. Wings clear. Eyes and ocelli with brown pigment.

Head 1·5 times longer than broad. Eyes large oval, one-third the length of head, sides of vertex arched in front of eyes. Cheeks parallel, surface of occiput finely transversely striate. Potocular bristle short and pointed and less than half the breadth of an eye ; there are a few small isolated setæ on the head behind the eyes. Antennæ about 1·5 times length of head, 1st joint cup shaped, 2nd elongate cylindrical, 3rd narrow at base and broadest at apex, 4th to 6th similar to 3rd with the sides rounded towards apex ; 3rd to 5th subequal in engtli, 7th cylindrical almost of the same breadth throughout, 8th in the form of an elongate cone. Mouth cone short and bluntly pointed with the labrum sharp, extending to about ¾ of the prosternum.

Prothorax shorter than head, and with the two coxæ broader than long. Bristles of pronotum not conspicuous, postero-lateral bristles as long as breadth of an eye and dilated at tip ; Legs : The anterior femora somewhat stouter than the hinder ones, with a few minute bristles along outer margin, tarsi unarmed. Pterothorax longer than prothorax. Wings extend beyond 6th abdominal segment. 10 to 12 duplicate hairs at apex of forewing ; basal bristles dilated at tip and all the three of them of about the same length.

Abdomen elongate, with the lateral bristles of the tergites dilated at tip, those of the 9th tergite pointed and as long as the tube. The tube almost as long as the pronotum, breadth at base being half its length.

Measurements : Holotype male, Length 2·25 mm.

Head length ·306 mm. breadth ·198 mm. Prothorax length ·198 mm. breadth ·360 mm. Tube length ·180 mm. Pterothorax breadth ·432 mm. Antenna length ·450 mm. Antennal joints in μ. I 36 II 45 III 81 IV 72 V 63 VI 54 VII 54 VIII 36.

Described from two males collected by the writer on a wild shrub; Marudamalais, Coimbatore 2,000′ (No. 134). Named after Mr. Dudley Moulton a well known and pioneer American Thysanopterist and a personal friend of the author.

This species comes near *G. claripennis*, Ky., recorded from Java and *G. lividicornis*, Ky., from Malaya.

Gynaikothrips pallipes, Karny.

Gynaikothrips pallipes, K., *Bull. Jard. Bot. Buitenz.* X, 1913, p. 10.

Gynaikothrips pallipes, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 238.

Hab. and Loc. In leaf galls of black pepper (*Piper nigrum*), Wynaad, Malabar (No. 31).

Gynaikothrips uzeli, Zimmerman (*Bull. Inst. Bot. Buitenz.* VII, 1900, p. 12).

Hab. and Loc. In leaf folds of *Ficus retusa*, Kollegal and Coimbatore (No. 2), on a wild shrub Marudamalais Coimbatore 2,000′ (No. 133). This is a very widely distributed insect all over the world, and is referred to in numerous systematic papers.

Ramakrishnaiella, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 232).

Karny erected this genus for a *Gynaikothrips*-like form collected by the writer from Malabar. The striking generic characters are the possession of a strong genal bristle, and a tubercle-like projection at the side of the 8th abdominal segment.

Ramakrishnaiella unispina, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 232).

Hab. and Loc. Collected by the writer in leaf rolls of a wild plant, Taliparamba, Malabar (No. 8). See fig. 10*b*.

Ramakrishnaiella nirmalapaksha,* n. sp.

Macropterous female and male. 2·5 to 3 mm.

Color: Dark to deep reddish brown, posterior abdominal segments including tube of a deeper hue; front of tibia yellowish brown with both margins lined dark brown, all tarsi yellowish brown but the front ones lighter yellow; the junction of the hinder limb joints slightly paler in colour. Antenna: 1st joint colour of head; 2nd base and inner margin dark brown, rest yellowish brown; 3rd to 5th yellow tinged with brown, especially towards the apex, the brown infumation at apex increasing from the 3rd to 5th; 6th wholly greyish brown except base; 7th and 8th dark grey. Wings clear, fringes light greyish.

* Clear winged.

Head slightly longer than broad, cheeks slightly converging towards eyes, distinctly crenate, almost tuberculate with one long and four or five small sharp spines, one just behind eye and one or two near the long spine conspicuous. Eyes large and oval. Eyes and ocelli with some red pigment. Occiput with transverse striæ; mouth cone broad and roundly pointed, reaching middle of prosternum. Antenna with the 4th joint longest; 3rd to 6th broader beyond middle and with long sense cones on each side.

Prothorax shorter than head with the usual bristles, posterior lateral one a little more than one-third the length of prothorax, slightly dilated at tip. Fore femora stout, tibia narrow and curved at inner margin near base, tarsus with a triangular tooth at base. Wings broad and clear with from 23—25 duplicate hairs on fore wing, reaching 6th segment.

Abdomen with the bristles well developed; those of 9th segment pointed. Tube shorter than head, which is 1·3 times longer. Wing-retaining spines well developed.

Measurements. Holotype female. Length 3·2 mm.

Head length ·319 mm. breadth ·290 mm. Prothorax length ·262 mm. breadth ·487 mm. Tube length ·244 mm. Pterothorax breadth ·600 mm. Antenna total length ·558 mm. Antennal joints in μ I 47 II 56 III 103 IV 94 V 87 VI 72 VII 62 VIII 37.

Described from three males and three females. Collected by the author on *Eugenia* sp. at Marudamalai 1,500′ Coimbatore (No. 132); from a wild bush in Coimbatore (No. 108). This new species differs from Karny's genotype, *R. unispina*, chiefly in having clear wings, in the fore tarsus being toothed in both sexes, in the different coloration of the antenna, the structure of the cheeks, and the more numerous duplicate cilia in the fore wing; it is also stouter in build, and has a reddish brown tinge in colour.

MESOTHRIPS, Zimmerman (*Bull. Inst. Bot. Buit.* VII, 1900, p. 12).

Mesothrips apatelus, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 229).

Hab. and Loc. In leaf galls of *Ficus retusa*, Kollegal (No. 2*b*).

FIG. 30. *Mesothrips apatelus*, Karny ♀; *a*, 3rd to 8th antennal segments; *b*, head and prothorax. (From Karny.)

*Mesothrips bhimabahu,** n. sp.

Macropterous female and male. Length 2 to 3 mm. Colour: deep blackish brown with a slight tinge of reddish brown in parts; all femora and mid and hind tibiæ dark brown with a tinge of reddish brown in fore femur; the front tibia brownish yellow with both margins distinctly lined with dark brown; extreme apex of the four hind tibiæ and all tarsi brownish yellow. Antenna: 1st joint has colour of head, 2nd light brown, 3rd to 7th yellowish, each tinged with brown, especially towards apex, more distinct on 4th than 3rd; 7th almost brownish yellow at base and grey toward apex, 8th dark grey. Wings with a thin cloud of pale yellowish colour, base of fore wing brownish yellow; hind wings greyish along median line; fringes grey.

Head longer than prothorax, 1·3 times longer than broad. Cheeks parallel and distinctly crenulate with a few distinct bristles, those nearer base more or less conspicuous and sharp. Eyes large and almost spherical, broader than the space between them; ocelli clear, the anterior placed far forwards. Mouth cone comparatively short, roundly pointed, just reaching middle of prosternum. Antenna about 1·75 times longer than head, and filamentous; joints much longer than broad; fourth joint longest and broadest; it has, also, two very long sense cones on each side at apex; the middle joints are narrow at base and wider towards apex; 7th and 8th more or less cylindrical.

Prothorax with the bristles pointed and the postero-lateral almost half its length. Pterothorax distinctly broader than abdomen and sides converging towards it. Fore femur unusually stout and bulging out abruptly from the base, outer margin very convex, and almost as broad as or in some even broader than head. Fore tarsus with a sharp slightly curved tooth rising from its base. Wings distinctly constricted towards middle, and extend to the 7th abdominal segment; the distal bristle at base of wing extraordinarily long, pointed and curved, and more than double the length of the proximal one. Fore wing with 15 duplicate hairs.

Abdominal segments stout and distinctly transversely drawn out at the sides, the edges overlapping one over the other, making the lateral sides uneven. Bristles of 9th segment long and pointed, almost as long as tube; those of others much smaller. Tube shorter than head, almost as long as prothorax.

Measurements of holotype female length 2·5 mm.

Head length ·337 mm. breadth ·262 mm. Prothorax length ·290 mm. breadth ·562 mm. Tube length ·262 mm. Pterothorax breadth ·693 mm. Antenna length ·603 mm. Antennal joints in μ I 59 II 62 III 103 IV 109 V 90 VI 75 VII 65 VIII 40.

Described from four specimens collected by the author in leaf galls of *Ficus retusa* in Kollegal, Coimbatore, September, 1925. (No. 163). Due to the stout front femora, the toothed fore tarsi, and the constricted wings, this insect is described as a *Mesothrips;* but the long head, the more or less spined cheeks, and the

* With strong arms.

peculiar shape of the abdominal segments appear to be very characteristic of this species. Dr. Karny thinks this insect to be very close to his *vitripennis*.

Mesothrips indicus, Bagnall (*A.M.N.H.* (9) VII, 1921, p. 365).

Hab. and Loc. From bark of 'Sal,' Dehra Dun.

Mesothrips karnyi, Bagnall (*A.M.N.H.* (9) XIV, 1924, p. 639).

Hab. and Loc. Under dead pods of *Albizzia lebbeck*, Dehra Dun.

Mesothrips melinocnemis, Karny (*Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 228, fig. 25).

Hab. and Loc. Found by the writer on galled leaves of *Pothos scandens* Taliparamba, Malabar (Nos. 3 and 4).

EUGYNOTHRIPS, Priesner (Treubia VIII, Suppl. 1926, p. 157.)

Eugynothrips priesneri, n. sp.

Macropterous female. Length 2·5 to 2·75 mm. Colour dark brown; base of mouth cone and inter-segmental parts of abdomen paler; eyes and ocelli with brownish pigment; extreme base and lateral margins narrowly of fore tibia dark brown, rest yellow, extreme tips of the four hind tibiæ and all tarsi yellow; a small spot on ventral side of all tarsi dark. Antenna: joints 1 and 2 concolorous with head, apex of 2nd lighter; 3rd to 6th yellow, 3rd slightly paler than others; 7th yellow tinged with brownish, 8th dark brown. Wings with uniform pale greyish yellow cloud.

Head longer than prothorax and slightly longer than broad, sides slightly converging towards vertex. Eyes a little less than one-third the length of head. Occiput with transverse striæ; cheeks crenate with a few minute spines. Post ocular bristle longer than the eye and dilated at tip. Mouth cone roundly pointed reaching middle of prosternum; the labrum rather pointed. Antenna less than twice the length of head; 2nd joint constricted at base and broadest of all; 3rd to 6th sub-equal; 5th to 7th narrow at base; 7th broadly connected with 8th. Sense cones long and thin.

Prothorax shorter than head, dorsum with a network of fine striæ; the postero-lateral bristle as long as the post ocular and dilated at tip. Legs: fore femur stout and incrassate with minute bristles on surface; fore tibia narrow at base and broader towards apex; fore tarsus with a slightly curved tooth. Wings reaching 6th abdominal segment, not narrowed in the middle but somewhat abruptly narrowing towards apex. Fore wing with 8 to 10 duplicate hairs and the basal bristles dilated at tip. Pterothorax with sides arched and margins slightly serrated, 1·5 times longer than prothorax.

Abdomen elongate; bristles on posterior segments well developed and distally dilated. Tube as long as prothorax.

Measurements of holotype female length 2·75 mm.

Head length ·281 mm. breadth ·250 mm. Prothorax length ·244 mm. breadth ·468 mm. Pterothorax breadth ·562 mm. Tube length ·244 mm. Antenna length ·510 mm. Antennal joints in μ I 43 II 53 III 78 IV 81 V 78 VI 72 VII 65 VIII 40.

Macropterous male. Length 2·5 mm. similar to female, fore femur not so stout as in female.

Described from half a dozen specimens collected by the author on a garden shrub in Coonoor, Nilgiris (No. 67). The author takes the privilege of naming this insect after the well known authority Dr. H. Priesner as a token of the author's regard and gratitude for help received in this work.

Mallothrips, n. gen.*

Body stout, head longer than prothorax and distinctly longer than broad. The fore legs in both sexes very strongly developed, fore femora stout and incrassate almost as broad as the head, fore tibia narrow and slightly curved basally, broadest at apex, the inner angle at apex produced into a small blunt tubercle bearing a conspicuous bristle; fore tarsus with a strongly developed tooth just above base; the tarsal claw at apex and the bladder conspicuous. Mouth cone broadly rounded, reaching middle of prosternum, labrum rather pointed. 8th joint of antenna unusually small and closely united to the 7th. Wings apparently not narrowed but not clear in the preparations. The structure of the fore legs, especially that of the fore femora shows relations to *Arrhenothrips* H; the mouth cone, wings and general form resemble *Eugynothrips* P. Type *M. indica.*

Mallothrips indica, n. sp.

Macropterous female. Length 2·3 to 2·5 mm. Colour dark brown; base of mouth cone, intersegmental parts of abdomen and apex of tube lighter. Apex of fore femur, fore tibia and all tarsi yellow, but fore tibia with margins lined with dark brown; ventral tips of tarsi dark. Eyes dark, ocelli with brown pigment. Antenna: 1st joint concolorous with head, 2nd base and inner margin brown, rest yellow, joints 3 to 7 yellow, 8th grey; 3rd paler than 4th and 5th, 6th and 7th bright yellow; Wings with grey infumation.

Head a little over 1·25 times as long as broad, longer than prothorax, vertex slightly produced anteriorly with front ocellus. Eyes one-third as long as head, post ocular bristles at some distance behind, as long as eye and dilated at tip, basal ocelli near anterior part of eyes, one distinct bristle behind each basal ocellus just opposite the inner margin of each eye. Cheeks behind eyes parallel, distinctly crenulate with a few spines, one behind each eye conspicuous. Occiput with trans-

* Malla=a fighter.

FIG. 31. *Mallothrips indica*,n. g. and sp. Head and Prothorax.

verse striæ. Mouth cone roundly triangular with sides slightly constricted about middle and extending to a little beyond middle of prosternum, the apex of cone round but labrum rather pointed. Antenna 1·5 times longer than head, middle joints long, 8th joint very short, shorter than the 1st and closely united to 7th ;

2nd cylindrical slightly narrowed at base, 3rd to 6th narrow at base and broadening towards apex; 2nd to 6th of almost same breadth; 3rd longest, 7th of almost same breadth throughout.

Prothorax distinctly shorter than head and ·75 times length of pterothorax; bristles not very strongly developed, the postero-lateral one as long as eye and dilated at tip. Pterothorax long and stout, broader than long with the sides slightly arched and narrowing towards base of abdomen. Legs stout, fore femur very strongly developed, incrassate with a few short spines along outer margin near base, and as broad as the head; fore tibia narrow at base, broadest at apex with the inner margin of latter produced into a short tubercle with a conspicuous bristle which is ·75 times the length of post ocular. The curved tarsal claws and bladder of all tarsi very conspicuous. Wings reach 7th segment of abdomen, apparently not constricted at middle (not clear in the preparations).

Abdomen elongate, lateral sides almost parallel up to 7th segment, lateral bristles of 9th segment dilated at tip and almost as long as tube. Tube short, shorter than prothorax, as long as breadth of head.

Measurements of holotype female, length 2·35 mm.

Head length ·290 mm. breadth ·225 mm. Prothorax length ·262 breadth ·422 mm. Pterothorax breadth ·487 mm. Tube length ·218 mm. Antenna length ·524 mm. Antennal joints in μ I 31 II 56 III 100 IV 97 V 84 VI 75 VII 56 VIII 25.

Macropterous male. Length 1·75 mm. similar in other respects to female, the fore leg not so stout as in female.

Described from three females and two males collected by the author in leaf galls of *Eugenia jambolana*, Coimbatore (No. 79).

DINOTHRIPS, Bagnall. (*Tr. Nat. H. S. North* III, 1908.)

Dinothrips sumatrensis, Bagnall.

Dinothrips sumatrensis, Bagnall, *Tr. Nat. H. S. North*, III, 1908, p. 11.

Dinothrips furcifer, Schmutz, Sitz. A. W. Wien. Kl. 122, 1913, p. 1026.

Dinothrips sumatrensis, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 239.

Hab. and Loc. Under bark, Taliparamba, Malabar (No. 17).

This insect has been noted from parts of Malayasia also.

Family IDOLOTHRIPIDÆ.

GIGANTOTHRIPS, Zimmerman (*Bull. Inst. Bot. Buitenz.* VII, 1900, p. 18).

Gigantothrips elegans, Zimmerman. (Fig. 11).

Gigantothrips elegans, Z., *Bull. Inst. Bot. Buit.* VII, 1900, p. 18.

Gigantothrips elegans, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 239.

Hab. and Loc. On different species of *Ficus*; from Kollegal (No. 2); from Malabar (No. 82); from Godavari (No. 114); from Coimbatore (No. 1); and from Bangalore (No. 120). Recently received from Pusa, collected from *Ficus glomerata*.

Gigantothrips tibialis, Bagnall.

Gigantothrips tibialis, B., *A.M.N.H.* (9) VII, 1921, p. 364.

Gigantothrips tibialis, Karny, *Ent. Mem. Dept. Agr. Ind.* IX, 1926, p. 239.

Hab. and Loc. On leaves of *Caryea arborea*, Malabar (No. 36).

DICAIOTHRIPS, Buffa [1] (*Redia* V, 1909, p. 169).

Dicaiothrips bouvieri, Viuellet (*Bull. Soc. Ent. Fr.* 1914, p. 276).

Hab. and Loc. In Coonoor, Nilgiris (*Maindron* Coll.); host plant unknown.

Dicaiothrips crassiceps Bagnall (*A. M. N. H.* (9) VIII, 1921, p. 399).

Hab. and Loc. Host unknown, noted from Burma.

Dicaiothrips sp.

Hab. and Loc. On *Melia indica*, Kumli gardens, Dehra Dun (*Champion* Coll.). The writer found this unnamed species in Mr. Moulton's collection at San Francisco. The insect is neither *crassiceps*, B., nor *bouvieri*, V.; it is perhaps a new form.

PHOXOTHRIPS, Karny (*Suppl. Ent. Berl.* 1913, p. 132).

Phoxothrips breviceps, Bagnall (*A.M.N.H.* (8) XIV, 1914, p. 380).

Hab. and Loc. Hab. unknown, noted from Simla.

KLEOTHRIPS, Schmutz. (*Sitzber. Akad. Wiss.* CXXII, 1913, p. 1057).

Kleothrips subramanii, Ramakrishna (*Jour. Bomb. N.H.S.* Vol. XXX, 1925, p. 788). Fig. 32.

Hab. and Loc. In leaves of Palmyra palm, Chingleput near Madras (No. 65). The unusually produced vertex and the extraordinarily long third joint of the antenna appear to be very unique in this insect and separate it from all known species of *Kleothrips* and Karny's *Acrothrips*, it is nearer the latter in some features.

IDOLOTHRIPS, Haliday (*Homop. Insect. Brit. Mus.* 1852, p. 1096).

Idolothrips halidayi, Newman (*T.E.S.*, 1856, p. 265).

Hab. and Loc. On *Anacardium* sp., Mysore (*Hamilton* Coll.).

This is one of the earliest Thysanoptera recorded from India. From the description it is not clear to what genus it belongs; the described characters bring it closest to *Gigantothrips* Z., as far as the author can make out.

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[1] *loc. cit.*

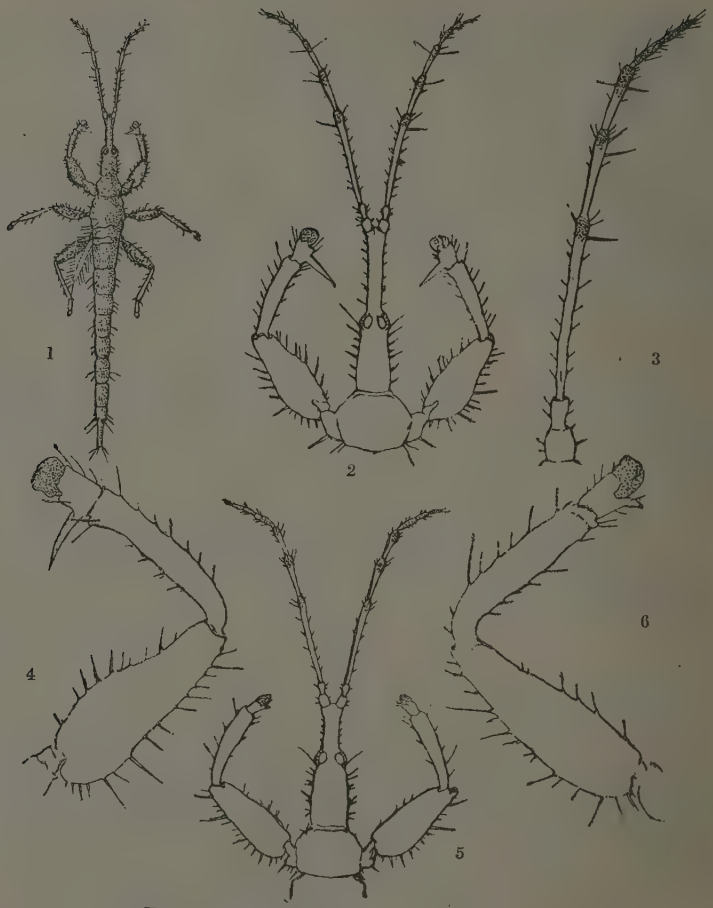

FIG. 32. *Kleothrips subramanii* Ramakrishna.
FIG. 1. Male insect × 12.
„ 2. „ anterior region × 30.
„ 3. „ antenna × 60.
„ 4. „ right foreleg × 60
„ 5. Female anterior region × 30.
„ 6. „ left foreleg × 75.

Family HYSTRICOTHRIPIDÆ.

LEUWEENIA, Karny (*Marcellia* XI, 1912, p. 161).

Leeuwenia (*Paneurothrips*) *coriaceus*, Bagnall (*A.M.N.H.* (8) IX, 1912, p. 216 and also (9) XIV, 1924, p. 640).

Hab. and Loc. On *Paiman* (*Eugenia operculata*) Dehra Dun (Coll. *V. S. Iyer*).

Leeuwenia eugeniæ, Bagnall (*A.M.N.H.* (8) XIV, 1924, p. 640).

Hab. and Loc. On *Eugenia jambolana*, Western Ghats, S. India (No. 63).

Leeuwenia indicus, Bagnall (*A.M.N.H.* (8) XIV, 1914, p. 377).

Hab. and Loc. In Burma; host not known.

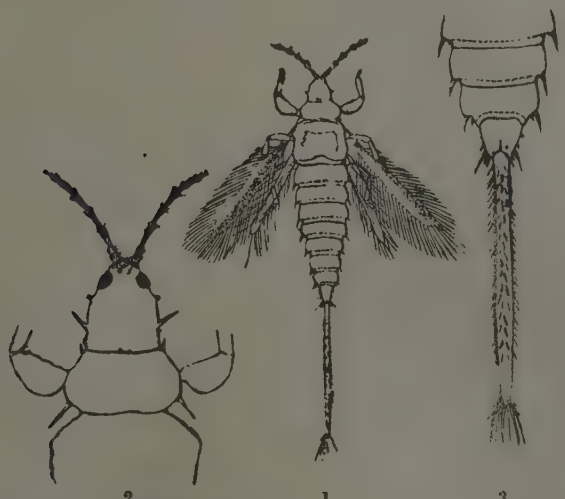

FIG. 33. *Leeuwenia Karnyi* Ramakrishna.
Fig. 1. Adult insect × 28.
„ 2. Anterior region × 84.
„ 3. Hind region × 84.

Leeuwenia karnyi, Ramakrishna (*Jour. Bomb. N.H.S.* Vol. XXX, 1925, p. 791), fig. 33.

Hab. and Loc. On *Eugenia jambolana*, Bangalore, Mysore.

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FIG. 1. *Isoneurothrips orientalis*, Bagnall ♂.
FIG. 2. *Thrips florum*, Schmutz ♀, from Hibiscus flowers.
FIG. 3. *Theips florum*. Schmutz ♂, from Banana flowers.
FIG. 4. *Mycterothrips setiprivus*, Karny ♀.
FIG. 5. *Anaphothrips oligochætus*, Karny ♀.
FIG. 6. *Anaphothrips ramakrishnai*, Karny ♂.

[From Karny]

FIG. 1. *Arrhenothrips ramakrishnæ*, Hood.
FIG. 2. *Dolichothrips ochripes*, Karnyi.
FIG. 3. *Haplothrips soror*, Schmutz ♀

FIG. 4. *Rhynchothrips pallipes*, Karnyi.
FIG. 5. *Neoheegeria indica*, Hood.
FIG. 6. *Eurhynchothrips ordinarius*, Hood.

[From Karnyi]

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